FOUNDRY TRADE JOURNAL

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OCTOBER 27, 1960
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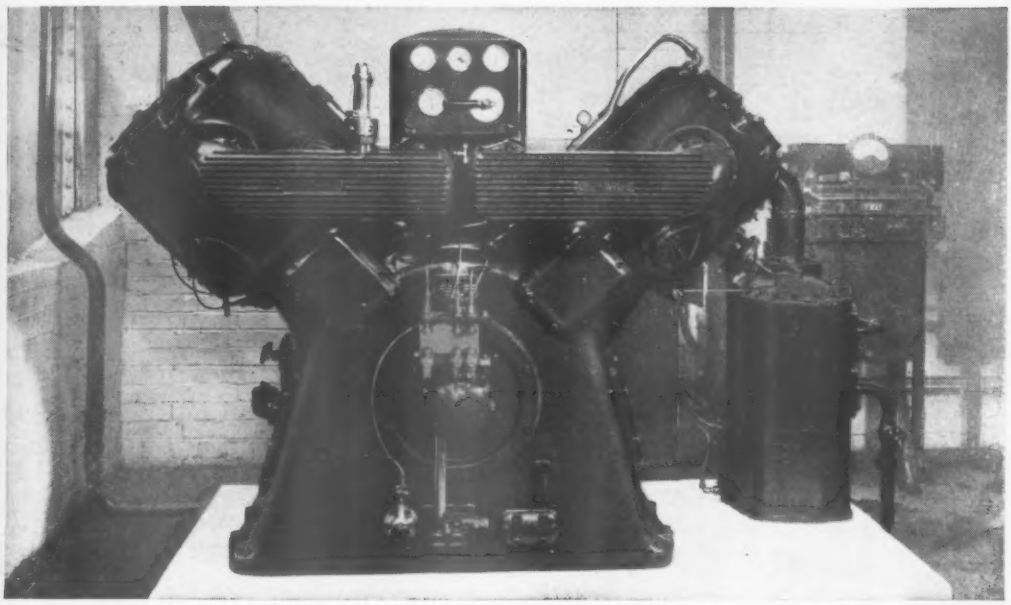

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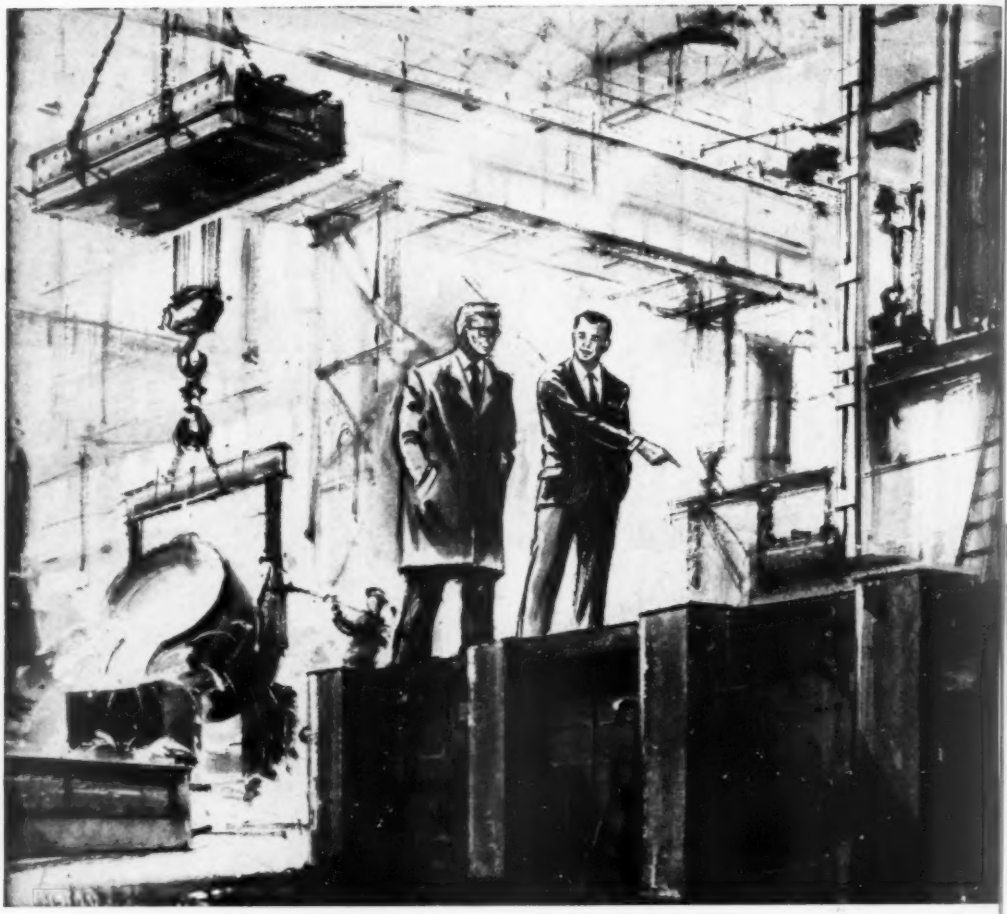

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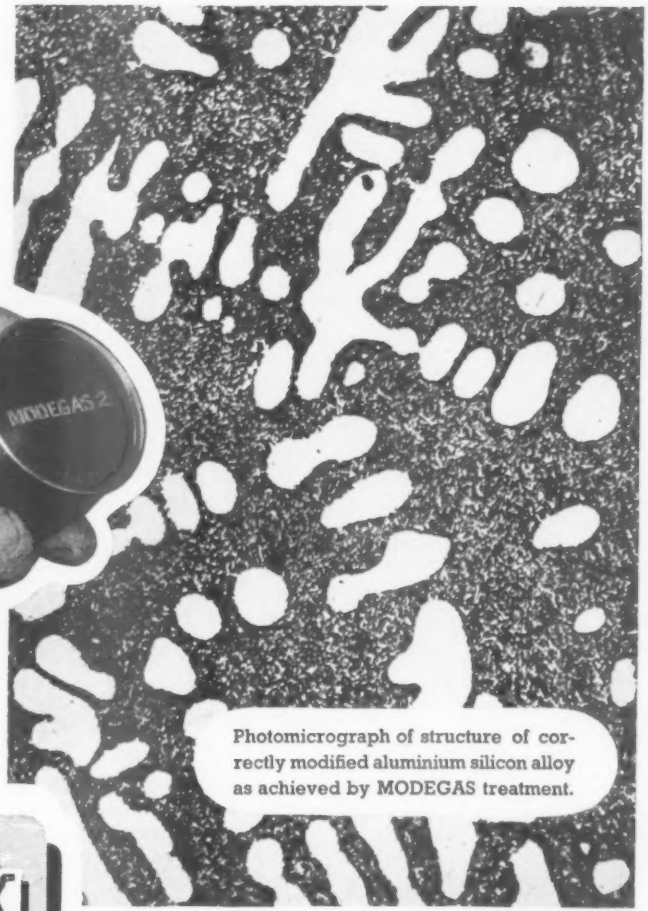

Photomicrograph of structure of correctly modified aluminium silicon alloy as achieved by MODEGAS treatment.

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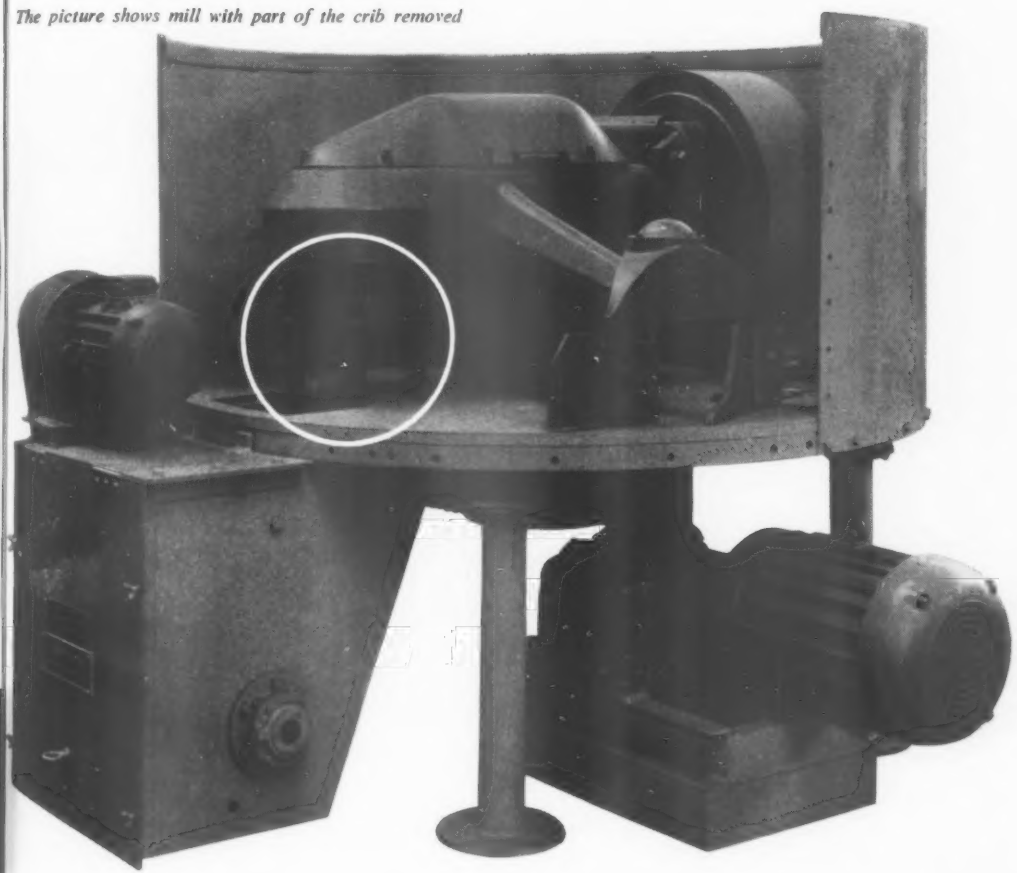
THIS NEW MIXING MILL, WITH THE POSITIVELY DRIVEN STIRRERS, IS ESPECIALLY SUITABLE FOR THE PREPARATION OF CO_2 SAND.

The picture shows mill with part of the crib removed



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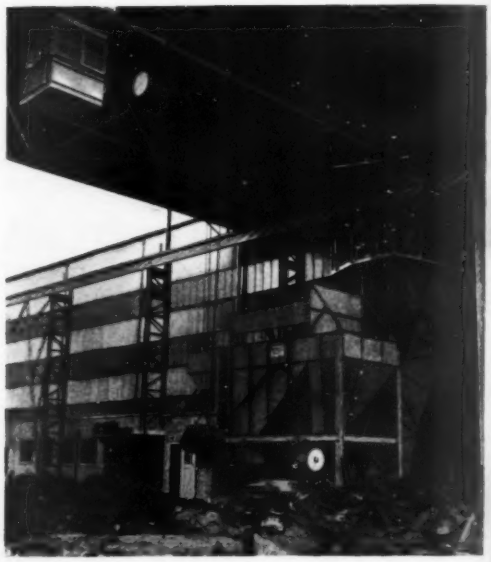

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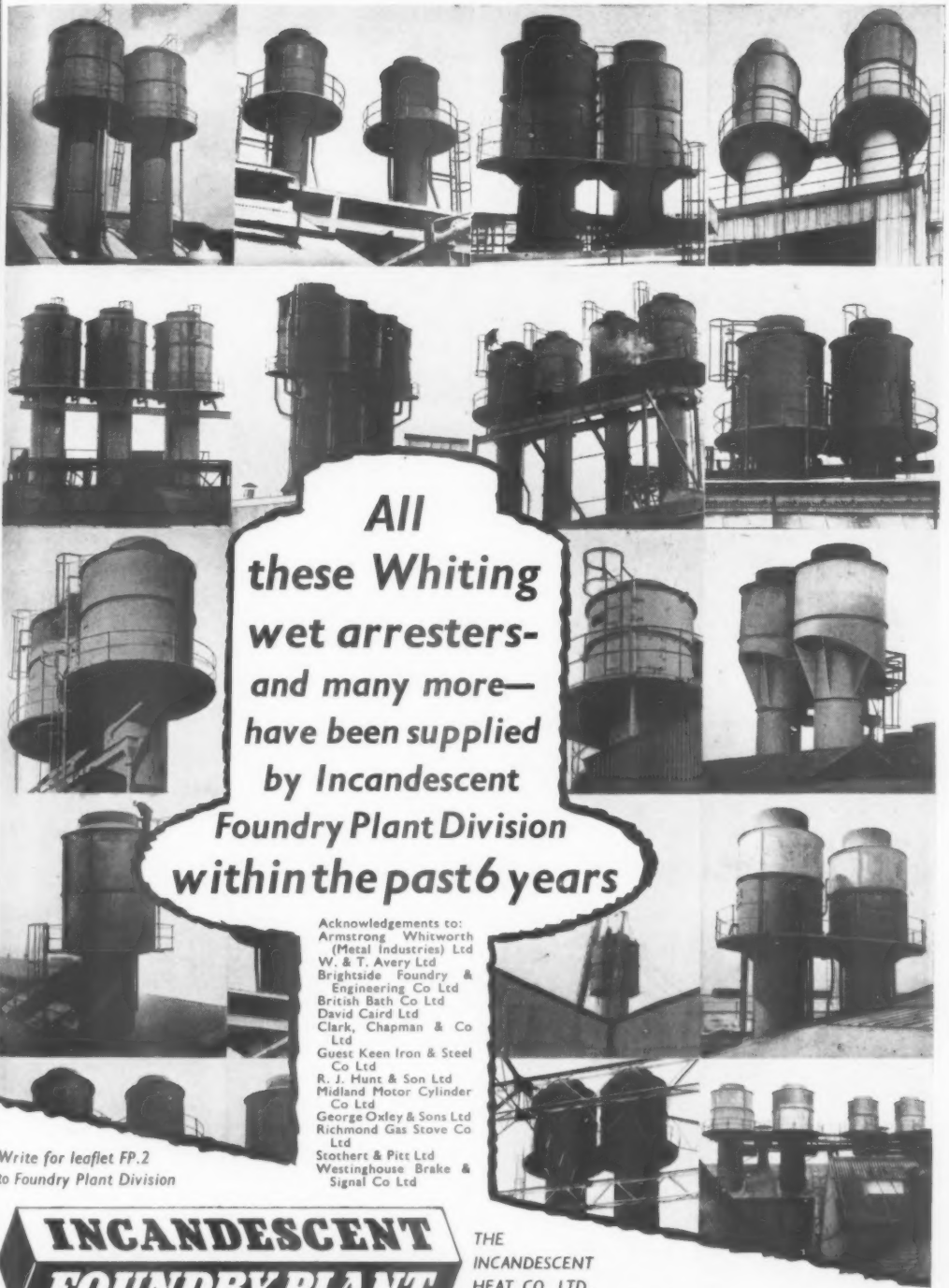

All these Whiting wet arresters- and many more— have been supplied by Incandescent Foundry Plant Division within the past 6 years

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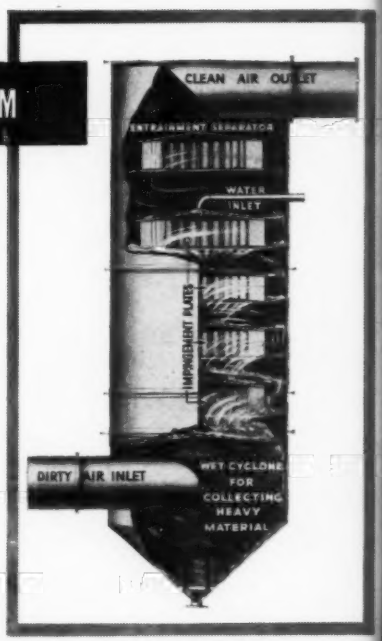

A Holmes-Schneible Multi-Wash Collector, Type "IC".

A cut-away view of an HI Type Holmes-Connersville Positive Air Blower.

HOLMES-CONNERSVILLE POSITIVE DISPLACEMENT BLOWERS

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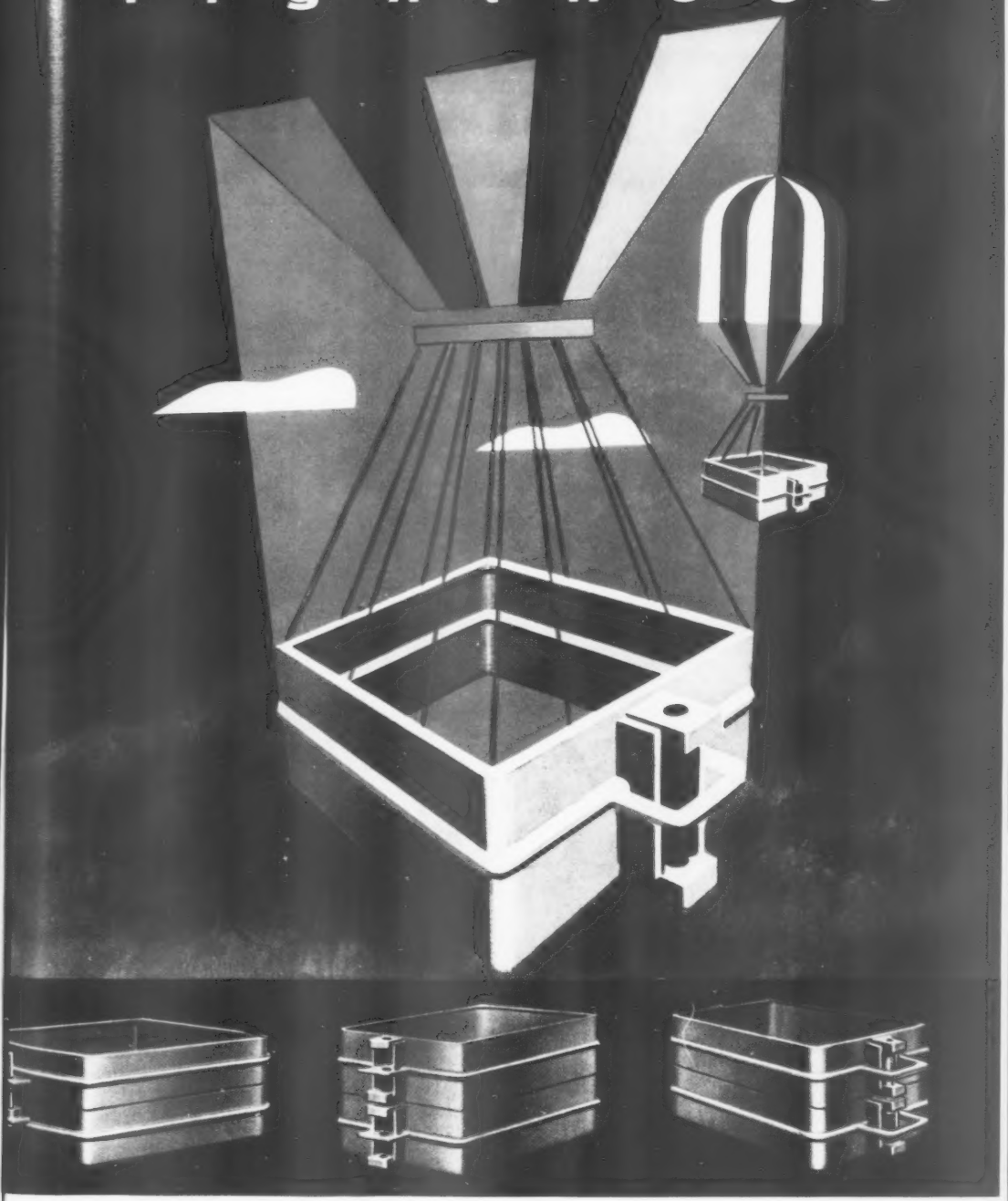

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These are illustrated, the second Cupola from the left is " blowing " —note the complete absence of dark smoke, sure proof of efficiency.

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Photograph of Grinding Balls cast in Chrome Manganese Martensitic Iron Alloy.

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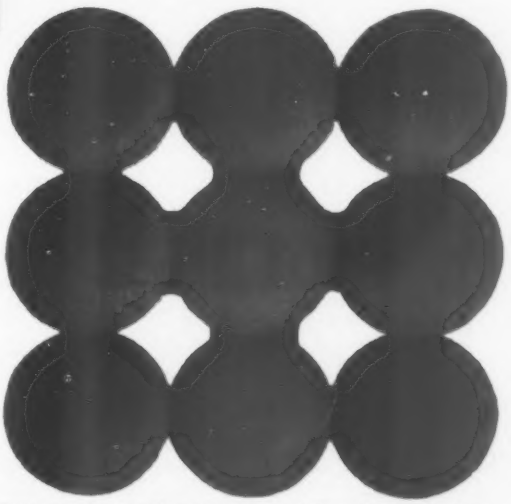

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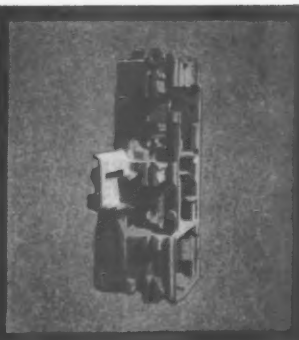
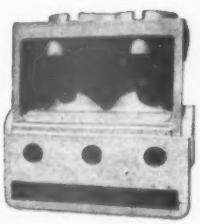
All these intricate iron castings were produced by Robert Cort & Son Ltd., Reading, using CO_2 for core and mould hardening and Isopropyl Alcohol as the base for the flash dressing. You can get this sort of result simply and consistently in your foundry too.





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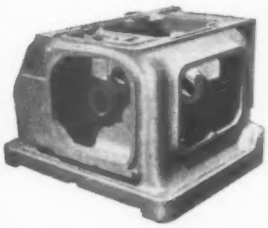

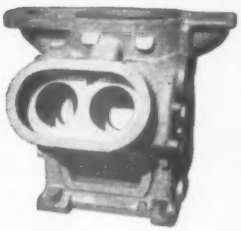

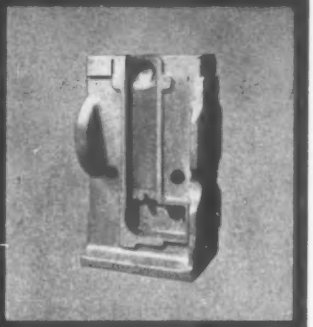

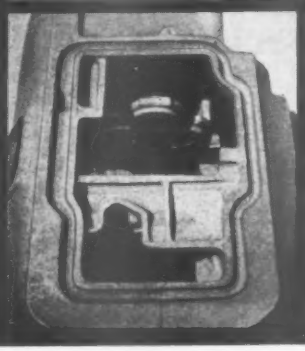

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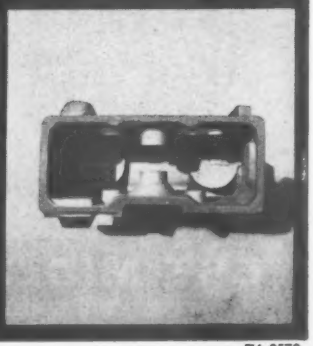

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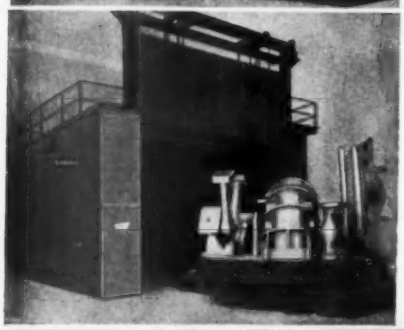

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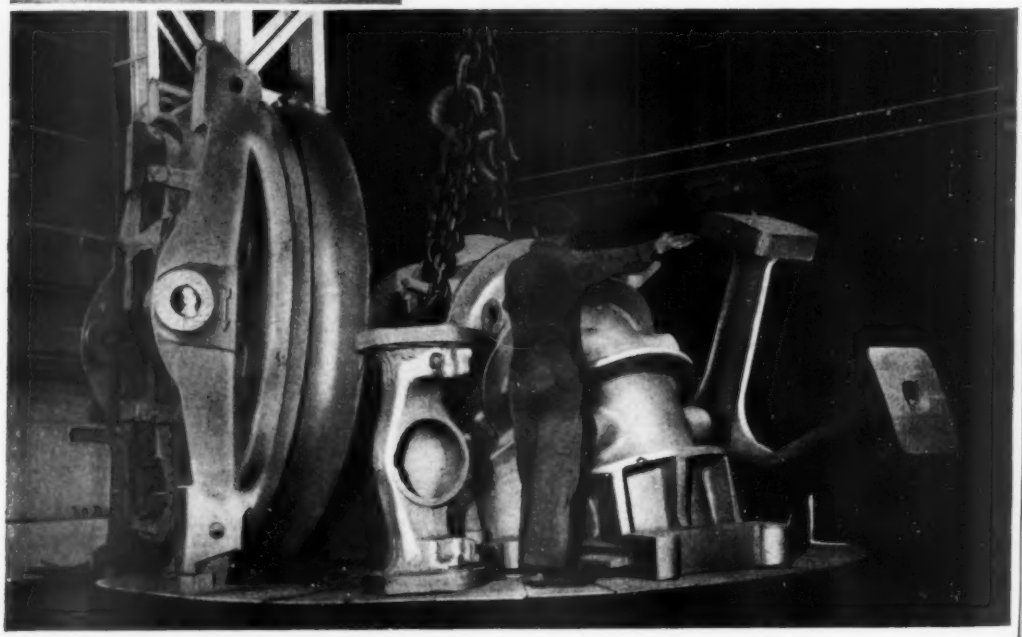

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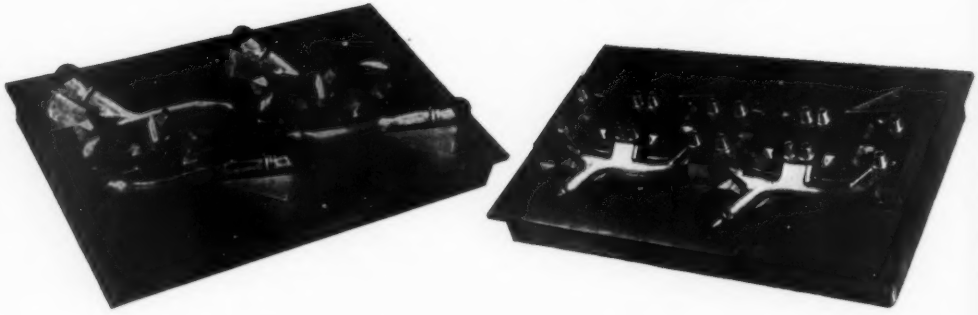

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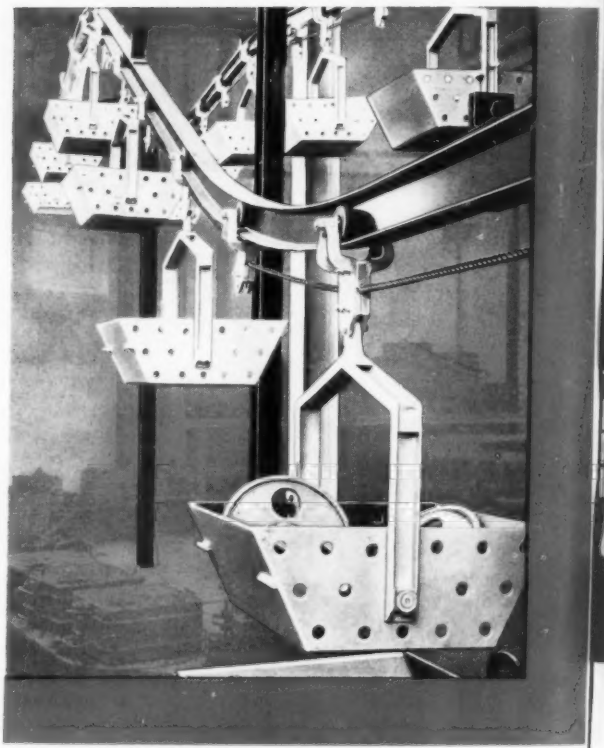

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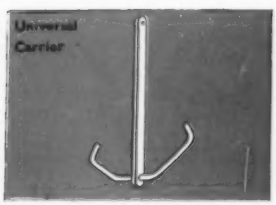

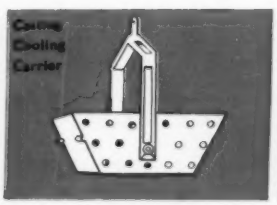

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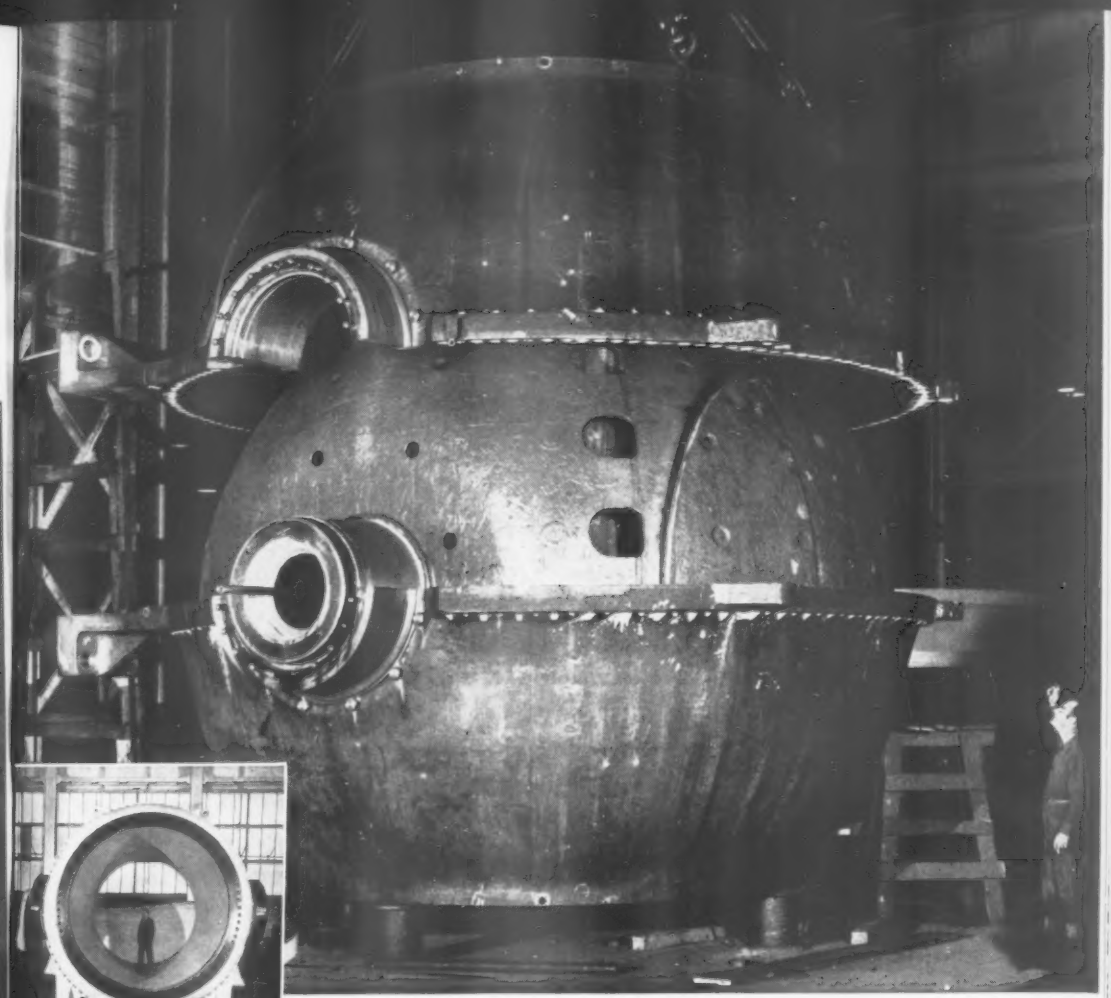

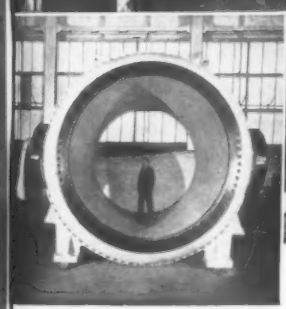

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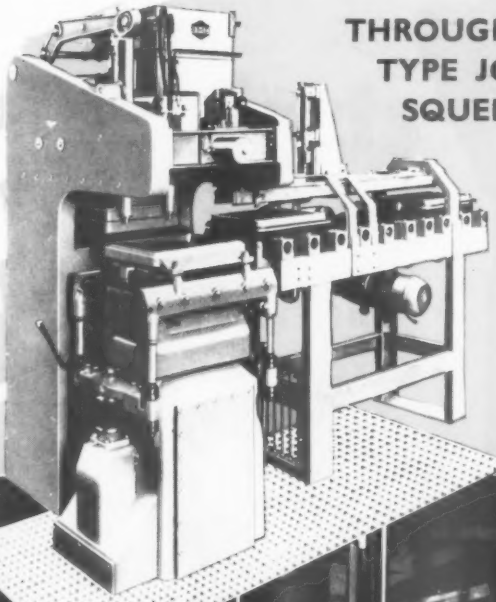

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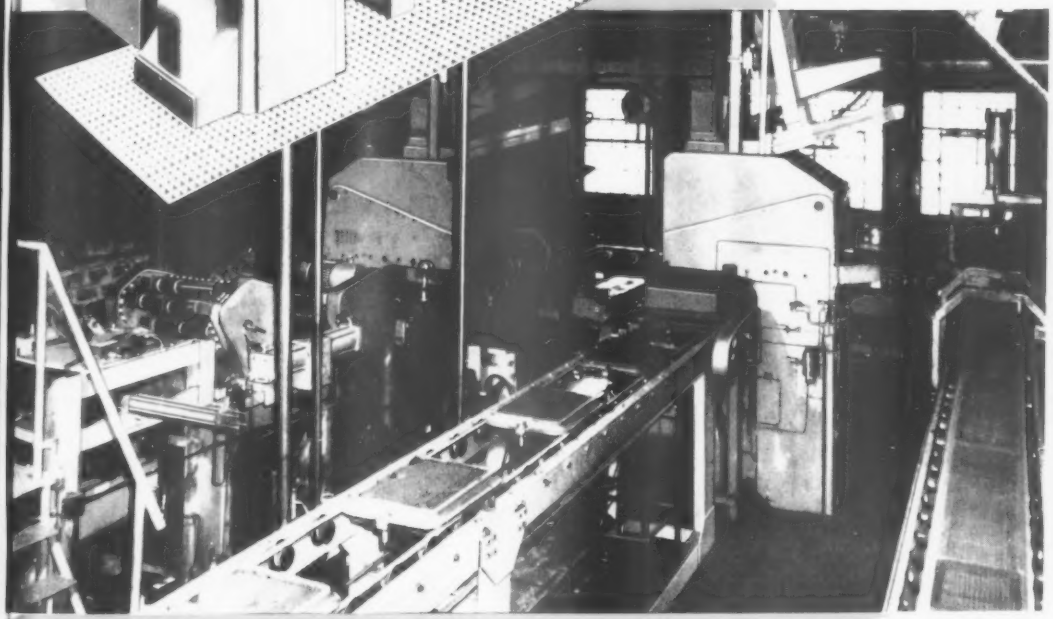

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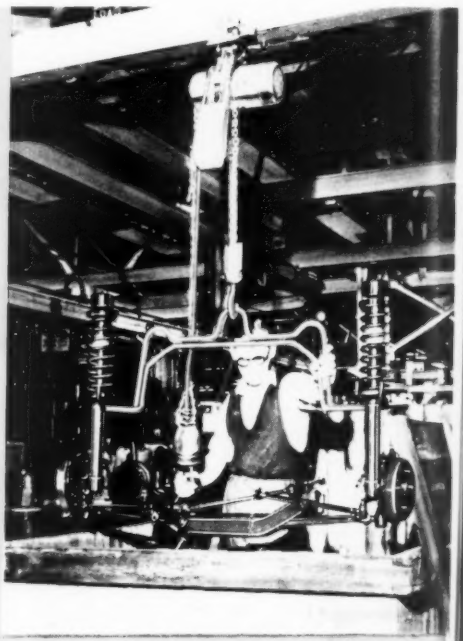

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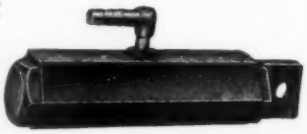

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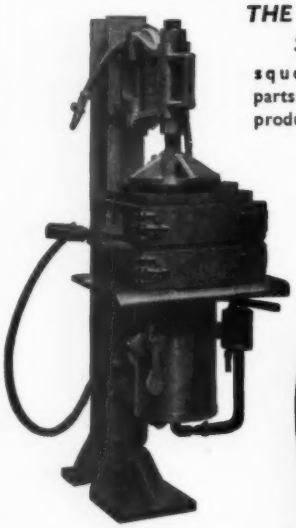

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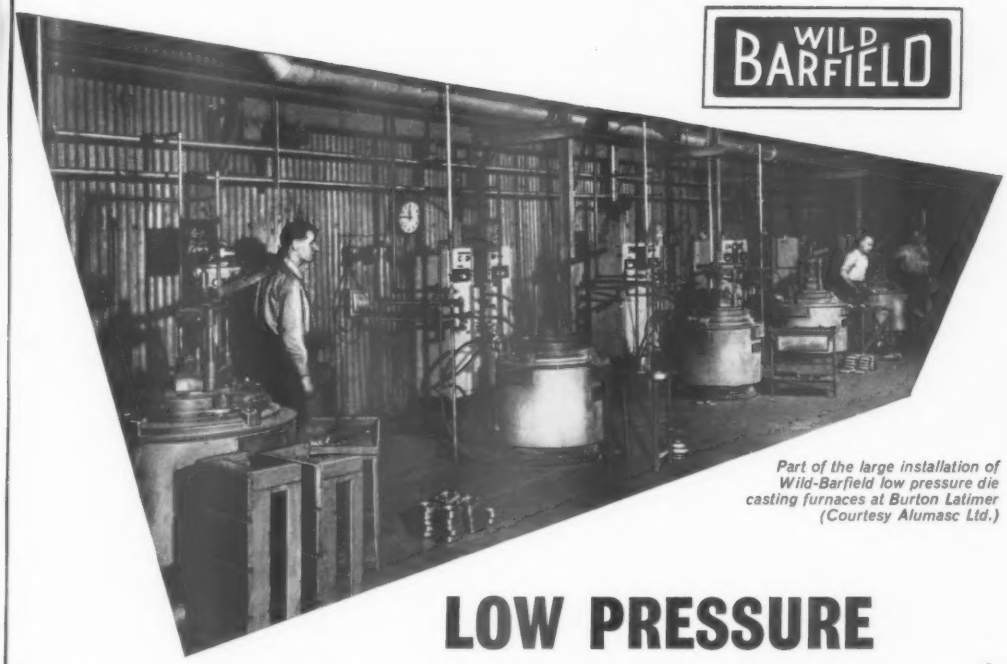

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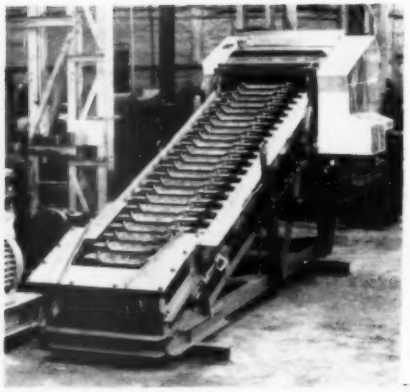

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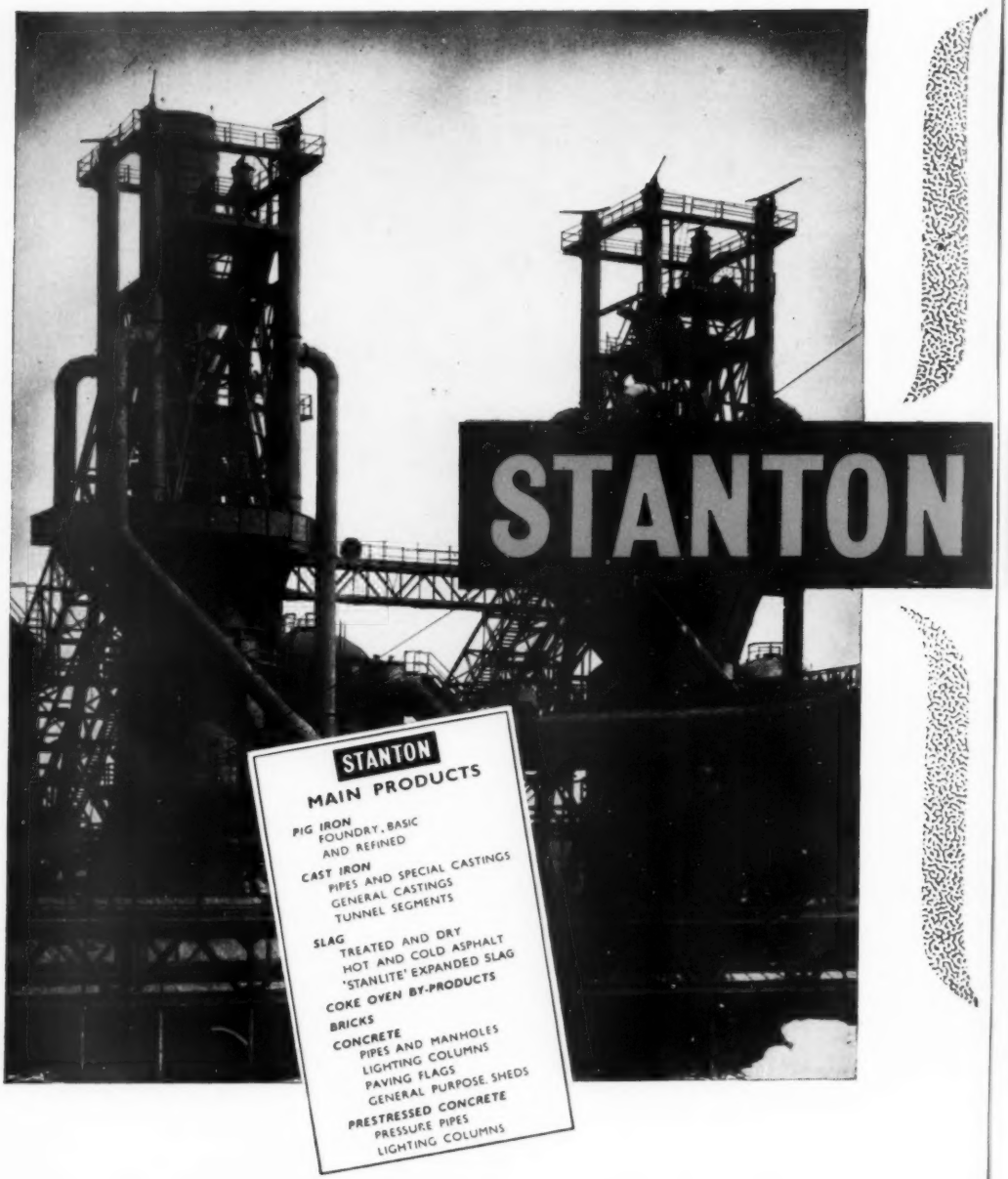

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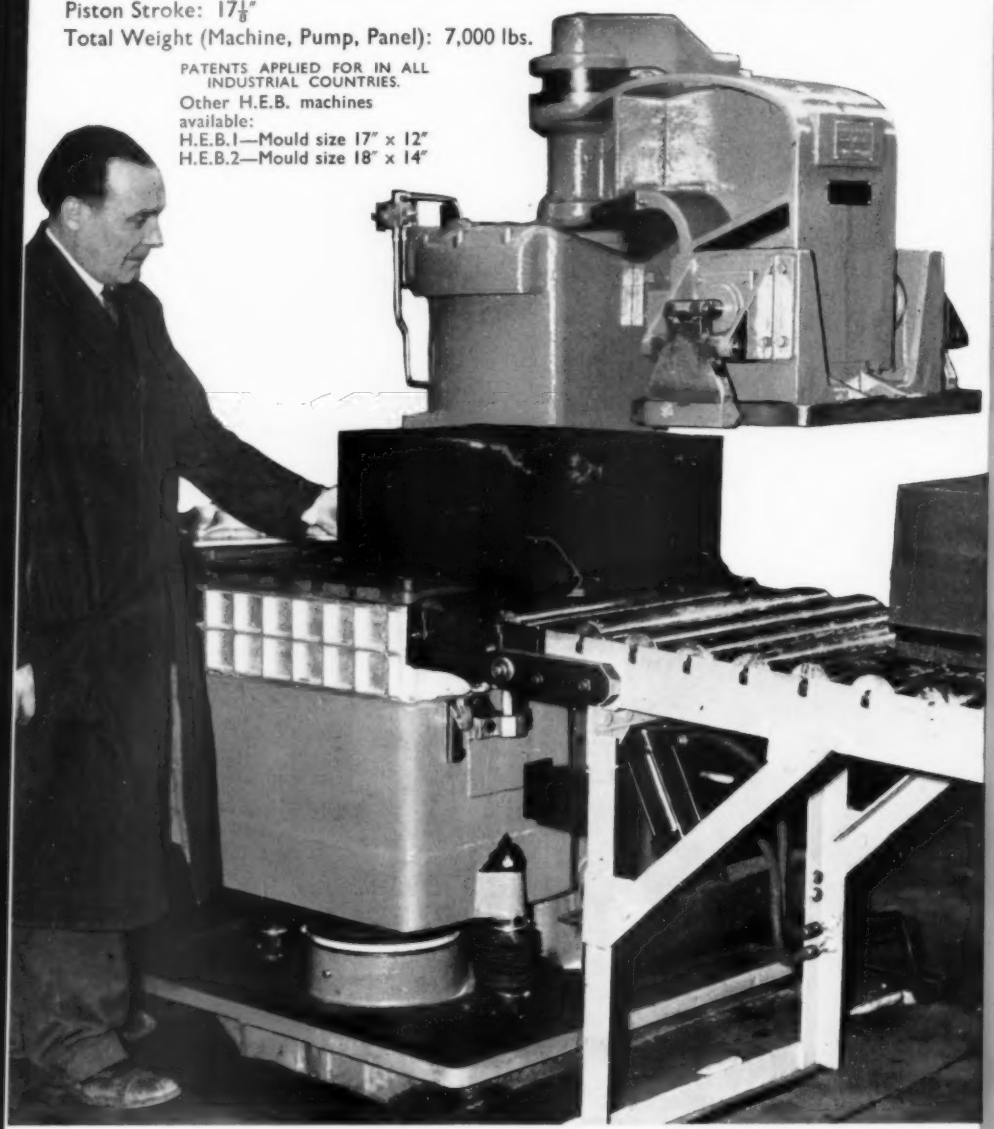

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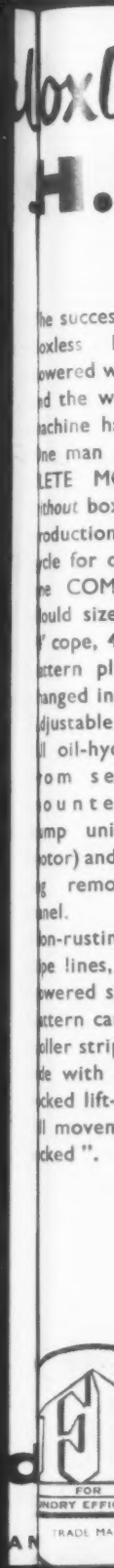

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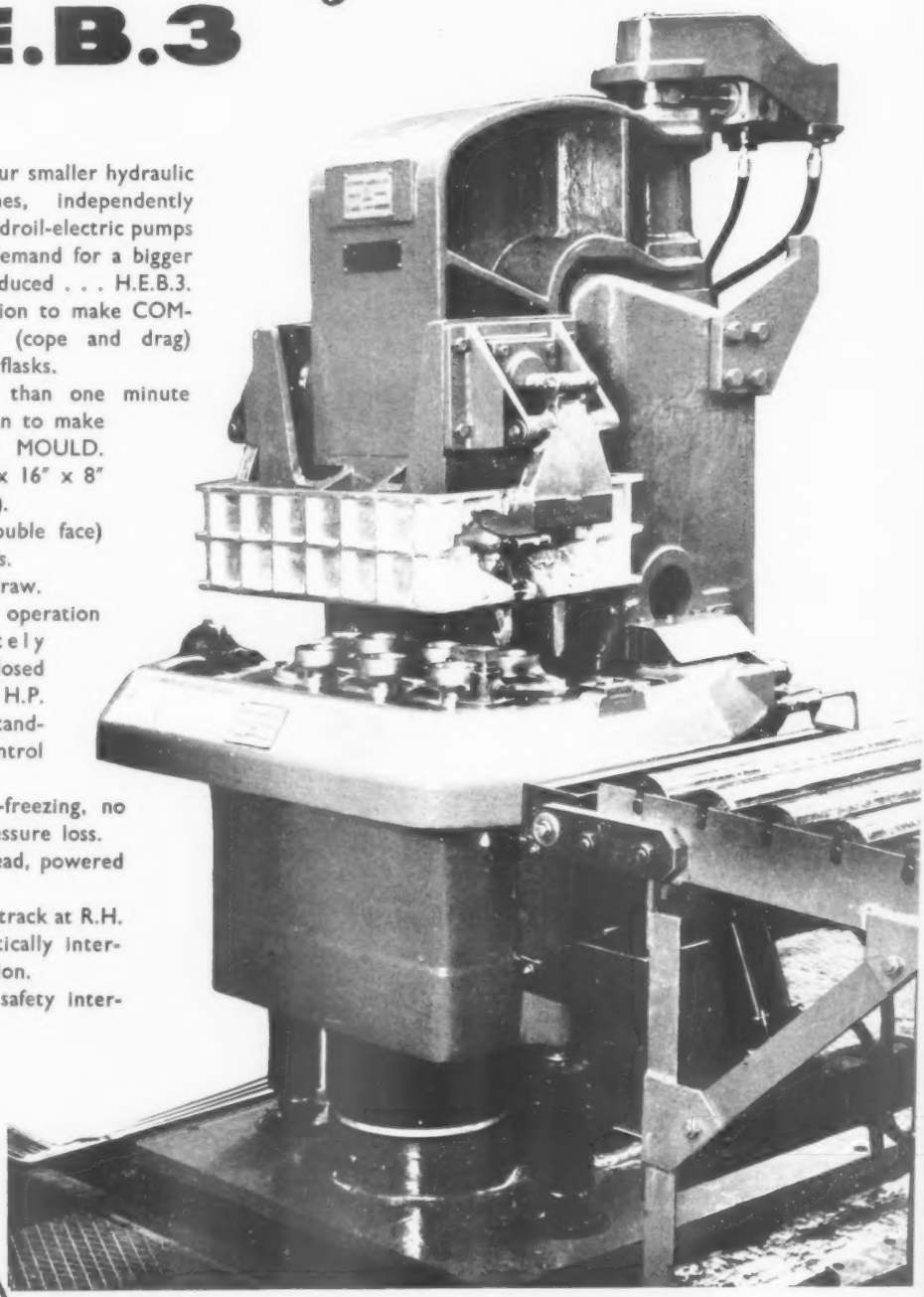

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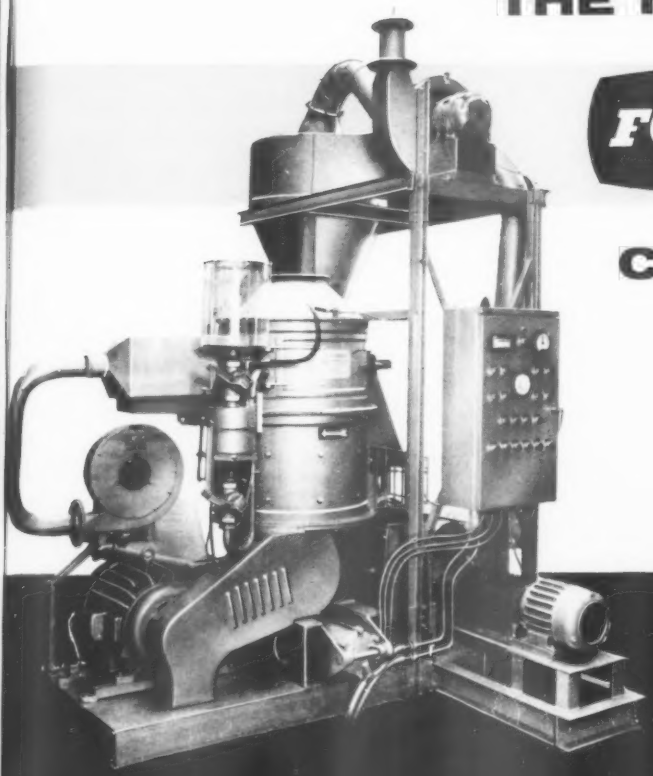

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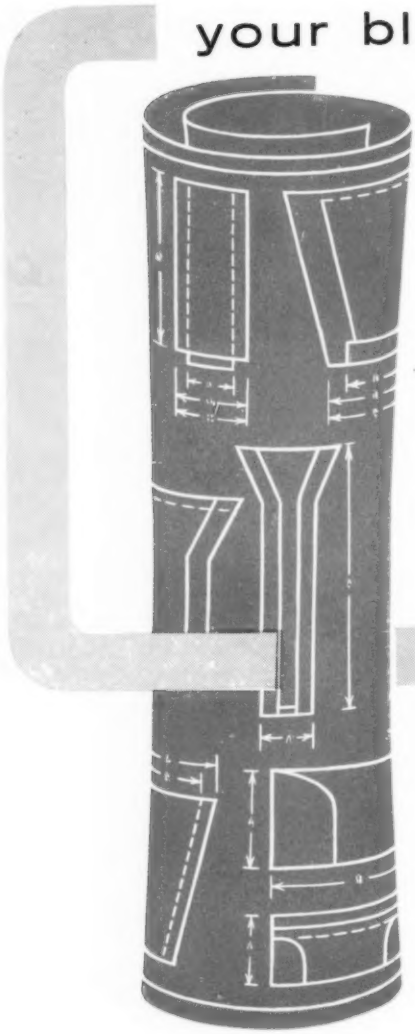

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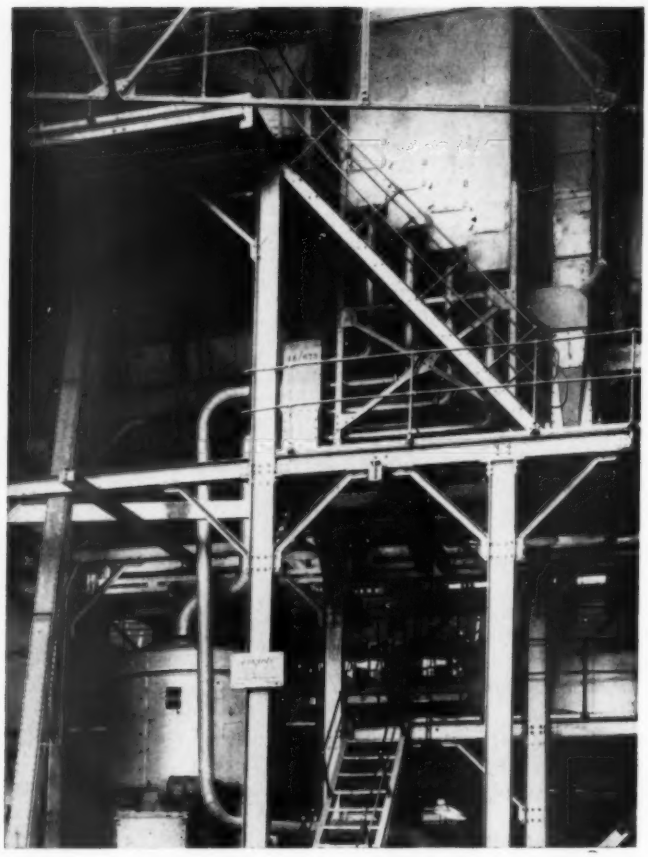
NEW SAND FOR OLD..

with the AUGUST-NATIONAL Sand recovery system



Photograph shows a compact arrangement of a sand recovery, storage, and mixing unit. Sand from the knock-out is charged to the August National Sand Scrubber (pneumatic reclamation) by means of a hopper with rotary table feeder. The reclaimed Sand is discharged into a bucket elevator which loads a storage hopper. A large 3F size Mix-Muller (batch capacity 4,000 lbs.) shown in the foreground, receives sand from this storage hopper, together with sand and additives from other hoppers, by means of an overhead travelling batch measurer with weighing device.

Photograph published by courtesy of Messrs. Catton & Co. Ltd., Leeds.

Sole Licensees and Manufacturers for the British Empire (excluding Canada, Australia and New Zealand) of the Simpson Sand Mixer.

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Conferences

Such is the plethora of conferences to-day that it is germane to examine what the foundry industry as a whole gets out of its conferences, both at national and international level. By and large, such gatherings are of two kinds. First, there is the general type, as typified by the Zürich International Congress* and the annual conferences of the Institute of British Foundrymen. Then there are the specialized conferences, as for example, the gatherings of the Foundry Research Associations, those of the Council of Ironfoundry Associations, the Meehanite, S.G. Iron, and Investment Casters organizations. In the first group, the proceedings are valuable as much from the point of view of social contacts made as from the technical content. Yet, they often suffer from trying to cover too wide a field. Delegates to such conferences pick up only gleanings of information, as it were, instead of ears-full of knowledge. Because of the wide coverage, attendance is mainly attracted from managerial levels of foundrymen (often, the same men year after year). They flit from session to session, or from one works visit to another, picking up titbits of technology or inspiration for application when back at the home plant.

It is the second and specialized type of conference on set themes that we commend as being the most rewarding to practical foundrymen. Two such conferences were held last week. One, the annual conference of the British Steel Castings Research Association, attracted over 200 delegates of member-firms to Harrogate on Thursday and Friday. The second, a conference of Shaw Process practitioners, engaged the attentions of 60 representatives of licensee-firms from seven countries (including America) for a similar period in Paris. Though not, of course, on the same scale, the proceedings of the two conferences were alike in offering a high content of down-to-earth technology to just those men in the respective industries who could make most use of it. At the steelfounders' meeting, the general theme of "control" was taken as a basis for eight papers†, ranging in subject-matter from mould production to ultrasonic inspection of castings, the "highlight" being an exchange paper from the Association's counterpart in America. Contributed by Mr. C. Jenni, research director of General Steel Castings Corporation, Eddystone, Pennsylvania, this first paper gave a balanced survey of control practices applied amongst member-firms of the Steel Founders Society of America and as such provided an admirable backcloth for the whole of the subsequent proceedings. The Shaw Process conference, in turn, was not without its share of novelty; it reported, *inter alia*, the increasing size of investment castings and the part licensees can play in furnishing cast-to-size patterns and dies to the rest of the foundry industry.

A further valuable aspect of specialized conferences must not be overlooked. It is that the changing of the theme from year to year offers the opportunity to foundry owners of sending different personnel each time—those in fact for whom the subject of the year represents their day-to-day activity. Under such circumstances the meetings are of men who "talk the same basic language" and inevitably discussions are free and packed full of commonsense. Moreover, the sending of different men each year avoids petty jealousies within a firm. It can also be a way of showing to a fair number of junior technical men that their feet are set firmly on the ladder to success. In these times of depreciating monetary values, the seconding of a man to represent his company at gatherings of his contemporaries can be a really worthwhile incentive. It confers dignity and self-confidence, both very necessary attributes of the industry's future leaders.

* Report continued in this issue, page 535.
† Shortly to be abstracted in this JOURNAL.

Izon's Bicentenary

This month, Izons & Company, Limited, West Bromwich, celebrate their bicentenary, and are believed to be the original patentees of cast-iron bellied saucepans in the world. It was in 1760 that John Izon was established as a founder in Coleshill Street, Aston, Birmingham, but expansion was so rapid that in 1782, he moved to West Bromwich where he obtained a site with ample room to build, a water mill to provide power, a canal for transport and collieries in nearby Wednesbury.

Since the move to West Bromwich, the firm has over the years produced hundreds of different articles in cast iron and many are in use throughout the world. In May of this year, the company received the 1960 Design of the Year Award from the Council of Industrial Design for their range of entree dishes, oval casseroles and a tricorn heater stand. Although to-day many of the articles that the firm once produced in cast iron are now made in other lighter materials, it is a tribute to the skill and craftsmanship of Izons, founders over 100 years ago, that even to-day many of the items are still produced in the same form.

Versatile Production

Over the years, the company has not confined its activities merely to kitchen equipment—pots, kettles, saucepans, etc.—for in 1775, John Izon registered a patent for a cast-iron hinge with a secret joint, and as the company expanded, they produced door handles, brass ware and various carriage and furniture fittings. In their 200 years' history, the company has also undertaken the manufacture of boot jacks and racks, cork squeezers, three-legged pots, rice bowls, chimneypots and even toy cannon. Other items include such things as door knockers, hat, coat and umbrella stands, stoves of various sorts, cast-iron buttons for men's garments, garden rakes and rollers, and grid irons.

Even to-day with mechanization, Izons still retain a link with the past as all the cast-iron hollow-ware are still hand-moulded, while wipe tinning (the method of producing a polished interior) is yet another art from the past still carried on. It is interesting to note that the company still retains an extensive export market for hollow-ware and among the countries importing them are the USA, Canada, Peru, South Africa, Australia, Finland, Ceylon, Cyprus, several European countries and islands in the Pacific and West Indies.

"New Times—New Lines"

At one period, Izons employed 200 moulders to make rice bowls, but when foundries in India began producing them on a large scale during the first world war, it became necessary to develop new lines of production. As a result, Mr. J. H. Chesshire, the then managing director, his son, Col. J. Izon Chesshire, and Mr. A. Smith, the sales director, then introduced the making of light grey-iron castings, particularly for the electrical switchgear industry, and this production now forms a major part of the company's output.

Mr. W. H. Thursfield has been managing director of the company for over 20 years. He joined the company in 1906 at the age of 13 and, after war service and many years with the Albion Foundry Limited, Tipton, joined the board of Izons in 1937. Another director is Mrs. E. M. Jones, a great-great-granddaughter of the founder, John Izon. Her younger son, Mr. A. C. Jones, joined the company in 1946 and two years ago was made joint managing director with Mr. Thursfield. The chairman of the company is Mr. W. N. Bassett, and the other directors are Mr. W. E. Suter and Mr. G. E. Blyth.

Mr. C. G. T. Hyslop retires

Mr. C. G. T. HYSLOP retired from the board of Birfield, Limited, on October 19, upon reaching his 70th birthday, as required by the articles of the company. He will, however, continue to be chairman of three Birfield group companies, Phosphor Bronze Company, Limited, Kent Alloys, Limited, and R. Jones & Company, Limited.

Mr. Hyslop started his career at the age of 16 in the Bagot Street foundry in Birmingham of the Phosphor Bronze Company, and progressed through most departments of the foundry before being promoted to office work in 1910. By the time Phosphor Bronze became one of the founder companies of the Birfield group in 1938, Mr. Hyslop was in charge of the London and Birmingham foundries and had already been a director of the company for two years. He was appointed joint managing director in 1941. On October 19, 1955, upon reaching his 65th birthday, he retired as managing director and was appointed to the board of Birfield, Limited, on the following day.

Mr. Hyslop, who has 54 years' continuous service to his credit with Birfield group companies and their predecessors, is a founder member and past-president of the Association of Bronze and Brass Founders and is a vice-president of the Institute of Quarrying. He has made numerous trips to America studying foundry techniques and, in 1945, led a team of technicians to Germany to investigate non-ferrous foundries in that country.

Forthcoming Events

OCTOBER 31

Institution of Plant Engineers

West and East Yorkshire branch:—"Building a Modern Factory," by Mr. Philip Wyatt, 7.30 p.m., at the Houldsworth School of Applied Science, Leeds University.

Coventry and district section:—"Art Bronze Founding," by A. R. Parrott, 7.30 p.m., at the Lecture Theatre of the Herbert Art Gallery and Museum.

NOVEMBER 2

Institution of Production Engineers

London section:—Crawley group: "Review of the Vacuum Die-casting Process," by J. S. Addiscott, 7 p.m., at A.P.V., Limited, Crawley.

Nottingham section:—"Tractor Design and Production," by H. Ashfield, 7 p.m., at the Reform Club, Victoria Street, Nottingham.

Institute of British Foundrymen

North East Lancashire section:—"Jobbing Foundry Practice," by W. E. Connah, 7.30 p.m., at the Accrington College of Further Education, Sandy Lane.

NOVEMBER 3

Institute of Metals

London local section:—"Long-term Creep Tests: A Discussion on Recently Expressed Views," by N. P. Allen, 7 p.m., at the Royal School of Mines, Prince Consort Road, London, S.W.7.

Institute of British Foundrymen

Wales & Monmouth branch:—Exhibition by the Mond Nickel Company, Limited, and lecture "Welding of Ferrous Materials," 7 p.m., at the Engineers' Institute, Park Place, Cardiff.

NOVEMBER 4

Institute of British Foundrymen

Birmingham branch:—"Men Only" dinner, 7.30 p.m., at the Ward Arms Hotel, Dudley.

East Anglian section:—Dinner and social evening, 7 p.m., at the Oriental Cafe, Westgate Street, Ipswich.

S. GUTTERMAN & COMPANY, LIMITED—Mr. G. Levino has resigned from the board.

Production and Properties of Cast-iron Bar*

By J. Cumberland A.I.M.†

A demand for cast-iron bar to be machined into a wide range of engineering components, has given great incentive to the foundry industry to standardize its quality and rationalize its production on as repetitive, and economic, a basis as possible. In the following article, the rôle of static graphite-dies is referred to and the methods used in this connection briefly described. The Author goes on to deal with the contribution being made by the continuous-die-cast process, and the technique involved forms the subject of more detailed treatment. The economies arising from this latter mode of manufacture, and the favourable physical and metallurgical properties achieved, together with the intrinsic interest of the principles involved, make this article of great value to all foundrymen.

Cast-iron bar in stock sizes has been available "off the shelf" for many years, and is widely used by the engineering industry where it has supplanted to a great extent the use of individual-sand-castings for the production of small, essentially-cylindrical components. Economic advantages resulting from improved machinability and fewer injections have led to a variety of applications for machining parts from cast-iron stick. The original method of making bar consisted of casting in sand moulds, and gave a product metallurgically similar in structure and reliability to other sand castings. While moderate lengths can be cast in sand, there are certain difficulties, associated with bending and unsoundness, that tend to increase costs of components machined from sand-cast stick.

In the early 1930's production of iron bar by casting in metal chills was developed on a commercial scale, and resulted in a material having greater reliability than that given by the conventional process. One snag with this static die-casting process lay in the difficulty of casting small diameter bars in lengths of more than about a couple of feet. This was overcome some 20 years later with the development of the continuous-casting technique, which is currently used in the Sheepbridge Group for making virtually all the cast-iron bar up to 5-in. dia. By continuous casting in graphite dies, stick from ¾-in. upwards can be produced in almost unlimited lengths, with a degree of uniformity and reliability previously unheard of. Both the static- and continuous-die-casting methods of making cast-iron bar are in use at the Sutton-in-Ashfield foundry of Sheepbridge Alloy Castings, Limited, and these will now be described in more detail.

Melting, for both processes, is carried out in a conventional acid-lined cupola, of two-tons-per-hour melting capacity. This furnace operates at a 9:1 iron to coke ratio with a mixture of hematite-pig iron and selected-iron scrap and delivers molten iron at 1,380 to 1,400 deg. C. Close control is kept of chemical composition, and chill tests are taken at regular intervals so that a consistent, close-grained, readily-machinable grey cast-iron bar is obtained.

* Paper to be delivered in abstract to the Society of Glass Technology.

† The author is technical superintendent with Sheepbridge Alloy Castings Ltd., Sutton-in-Ashfield, a member of the Sheepbridge Engineering Group.

FIG. 1.—*Method of casting into split-type static stick-dies.*

FIG. 2.—*Cast stick being extracted from static dies.*

Static Die-process

Bar from 5-in. dia. up to about 2-ft. dia. is made by pouring the molten metal into cast-iron dies or moulds. For the smaller sizes the dies are usually of the split type, and are arranged in multiples in a rack (Fig. 1), thus facilitating disposal of the metal during the casting operation. Larger sizes are cast in one-piece cylindrical dies, a slight taper being allowed to aid extraction. The dies are of cast iron and are prepared for casting by coating with a carbonaceous slurry. Pouring temperatures vary in the range 1,220 to 1,300 deg. C. according to size, the larger the diameter the cooler the metal. When the iron has solidified and contracted from the die wall, the sticks are extracted, and taken away to cool. The surface temperature of the bar at this moment averages 700 to 900 deg. C. The split moulds are opened by releasing the clamping mechanism, and prising apart with a bar (Fig. 2), while the single-piece cylindrical moulds are lifted off from above. After stripping, the moulds cool to a suitable temperature for cleaning and redressing, and the cycle is repeated. Machining of die-cast stick is carried out on centre lathes (Fig. 3), the operation consisting of an external skim, of half to one inch in diameter, and parting-off a small discard at top and bottom. The upper discard is in effect a small feeder, and serves to take off any dirt which rises to the top. Careful visual inspection of the turned surface ensures complete absence of blowholes and slag inclusions, while an examination of the fracture formed on "knocking-off" the upper discard confirms the presence of the desired fine grain structure.

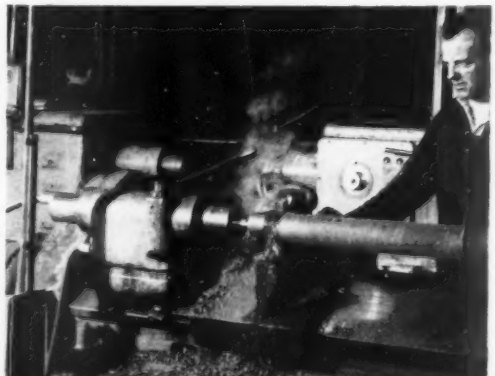
Continuous-casting Process

Bar from $\frac{3}{4}$- to 5-in. dia. is produced by a patented continuous-casting process developed about 10 years ago, and following, in principle, the lead given by Eldred, in the non-ferrous field. The machines are of the closed-system type and consist essentially of a liquid-metal reservoir sealed to an externally-cooled graphite-die, together with a mechanical means of extracting the solidified bar. Two designs of continuous-casting machine are used within the Sheepbridge Engineering group. In the first, or vertical type[1, 3], the die is attached to the bottom of a crucible mounted in an oil-fired furnace, and the freshly solidified bar is extracted downwards by means of a reciprocating-clamp arrangement, located directly underneath the furnace. An abrasive wheel is used to cut the bar into convenient lengths, which fall into a tilting bucket situated in a pit below the pulling machinery. Vertical machines are distinctly easier to operate on the smallest sizes of bar than are the horizontal type, but introduce certain hazards due to the height of the metal.

Horizontal Machine

This paper is mainly concerned with the alternative arrangement whereby production is carried out on the horizontal plane at ground level (Fig. 4)[2, 4]. A specially-manufactured crucible is required having a lower exit in the form of a side boss, into which the die is fitted. The cast bar is taken away horizontally by means of a clamp- or roller-pulling-machine, and runs along a roller track, under an abrasive cut-off wheel, to a disposal area, for batching on stillages. Horizontal machines are less costly to build and install than the vertical type, and can readily be re-sited. In the event of

FIG. 3.—*Short lengths of static die-cast stick are shown being turned in a lathe.*



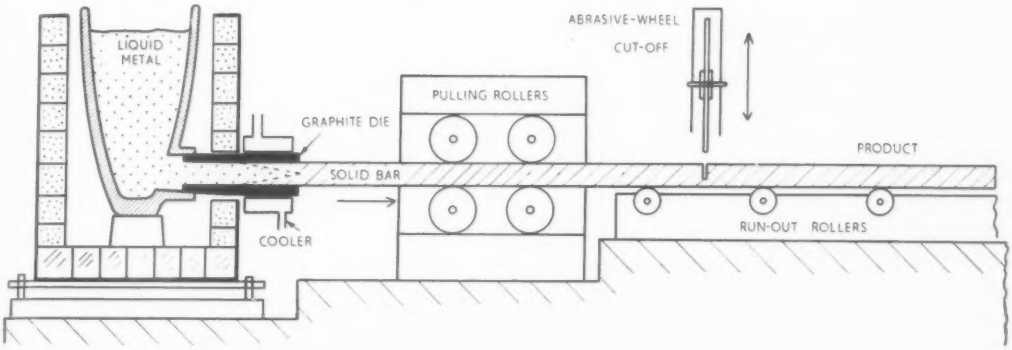


FIG. 4.—*Side elevation of horizontal continuous-casting machine.*

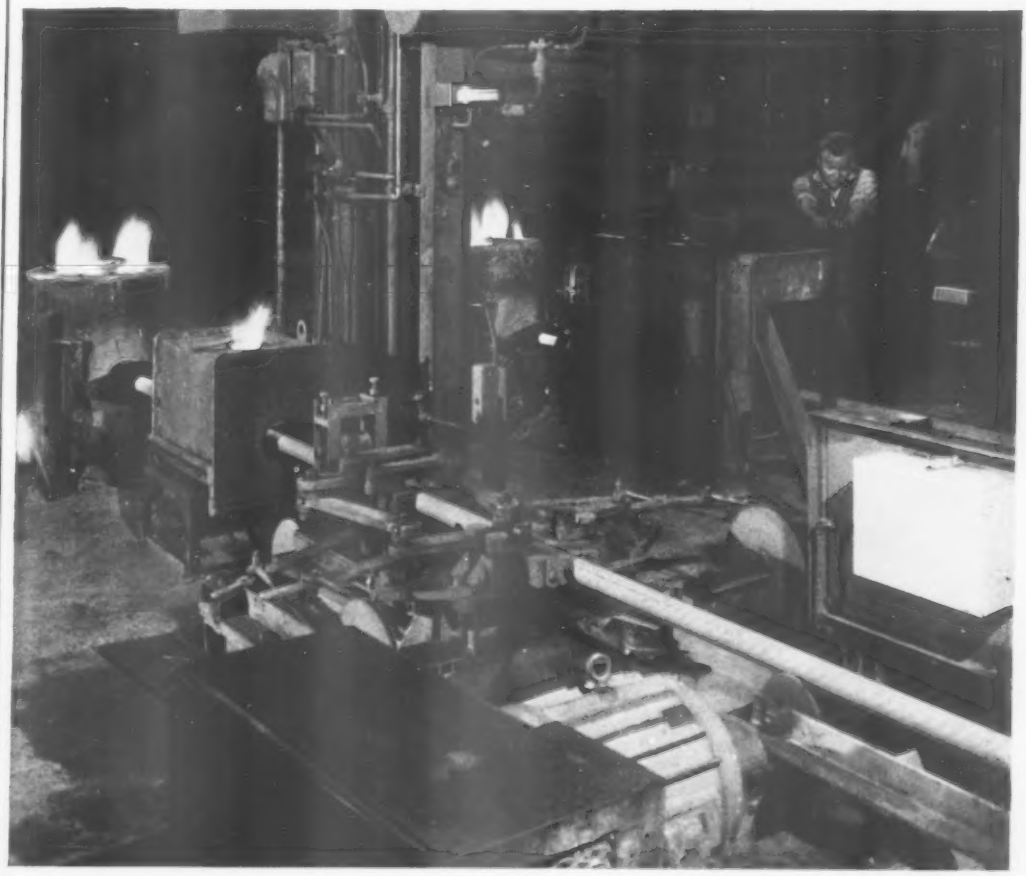


FIG. 5.—*General view of two horizontal continuous-casting machines, the schematic section view of which is shown in Fig. 4.*

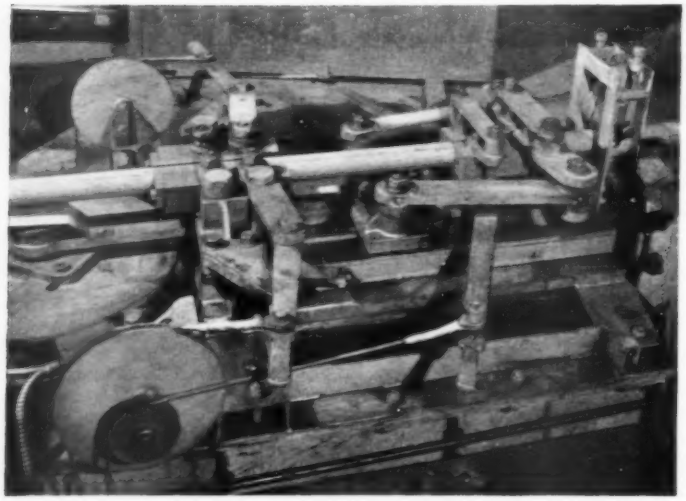


FIG. 6.—*Details of toggle-operated clamp pulling mechanism.*

an operational failure molten iron runs quietly away from the furnace into specially prepared sand beds. The crucible, of about 300-lb. capacity, is mounted in a brick-lined furnace heated by a single oil burner. Levelling adjustments are provided at the base of the furnace to permit alignment of the crucible side-aperture, with the roller track. The graphite die fits tightly into the crucible side-boss, and the joint is sealed with a plastic refractory-cement. The die consists of a tube some 20-in. long having a perfectly parallel bore the same size as that of the bar it is desired to make, and is machined from a dense grade of electrode graphite. A water jacket, or "cooler," is fitted over the half of the die which projects clear of the furnace casing, and forms the solidification zone, inside which the cast bar is formed. A limited amount of liquid cooling occurs in the portion of the die entering the crucible, but this acts essentially as a transfer channel to the sodifiication zone.

Pulling Mechanism

Three types of pulling mechanism are currently in use for extracting the newly solidified bar from the die assembly. The most recent, and most effective, grips the bar between serrated rollers, mounted in a stand at the front of the furnace. Adjustments to the vertical spacing of the paired rolls for size changes, are obtained by moving the upper-idle rolls by means of a manually-operated

FIG. 7.—*Machining operations are shown being carried out on continuously-cast bar on a Farmer Norton lathe.*

screw arrangement. Figure five shows an operator tightening these rolls for the purpose of increasing friction at the bar surface, and preventing slipping. Details of the second type of pulling mechanism are shown in figure six. This consists of two pairs of toggle-loaded clamps, and is actuated by a connecting rod from a variable-throw crankpin, on a rotating flywheel. The right hand pair of clamps, in the photograph, move longitudinally on a sliding table, and extract the bar from the die, then return to the original position

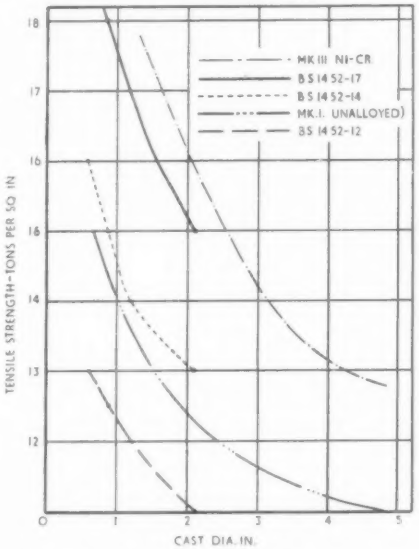


FIG. 8.—*Typical tensile strength of continuously-cast grey-iron bar.*

for the next cycle. On the return stroke the bar is gripped by the left-hand pair of clamps, so that the moving clamps (right hand) slide over the bar surface. Selective action of the clamps is aided by differential loading on the toggle levers and cutting-ratchet serrations—similar to those of a Stillson pipe-wrench—on the gripping surfaces. The third type of extracting mechanism uses pneumatic cylinders for both gripping the bar and for the longitudinal draw movement, and, owing to overheating of the cylinders, leading to irregularities in operation, has not proved satisfactory on any but the smallest sizes of bar.

Intermittent Action

These continuous-casting machines operate with an intermittent pulling action consisting of a series of strokes of the order of one to six inches movement of the bar coming out of the die, the strokes being separated by a dwell-period, of from a few seconds to one minute, during which solidification takes place. Intermittent pulling is an important practical feature of the process and considerably widens the latitude in operating-variables when compared with conventional truly-continuous pulling. The advantage of intermittent extraction lies in the manner of the rupture of the freshly solidified skin, which occurs within the die at the commencement of each stroke and results in reduced frictional forces, and lower tensile stresses in the partially-solidified bar. Various reciprocating- and spring loaded- "floating-mould" devices, employed in other industries, appear to serve an essentially similar function.

Production rates vary from twenty to a hundred feet per hour according to bar diameter and metal composition. Cycle control is by means of mechanical- or electrical-clock-type- timers, or thermal-delay units coupled to electronic, or magnetic, relays. The variables under control are, rate of movement, length of stroke, and duration of the dwell period.

Operation

The machine is started with a dummy bar held in the pulling-machine clamps (or rollers), and inserted part way into the die-solidification zone. A dovetail slot or hex-head set screw, at the die end of the bar, ensures that the first liquid metal to run into the die and solidify, keys on to the dummy bar. Prior to starting the crucible is preheated to 1,000 deg. C. When all is ready, the cooling water is turned on, and molten iron at 1,300 deg. C. is poured into the crucible. After a pre-determined waiting time, extraction is started, at a slow rate, and then gradually brought up to

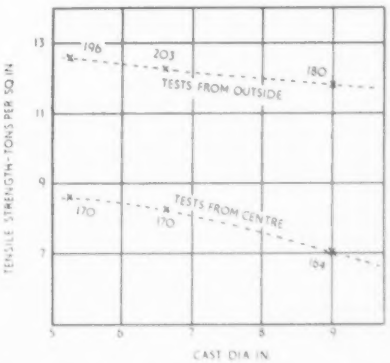
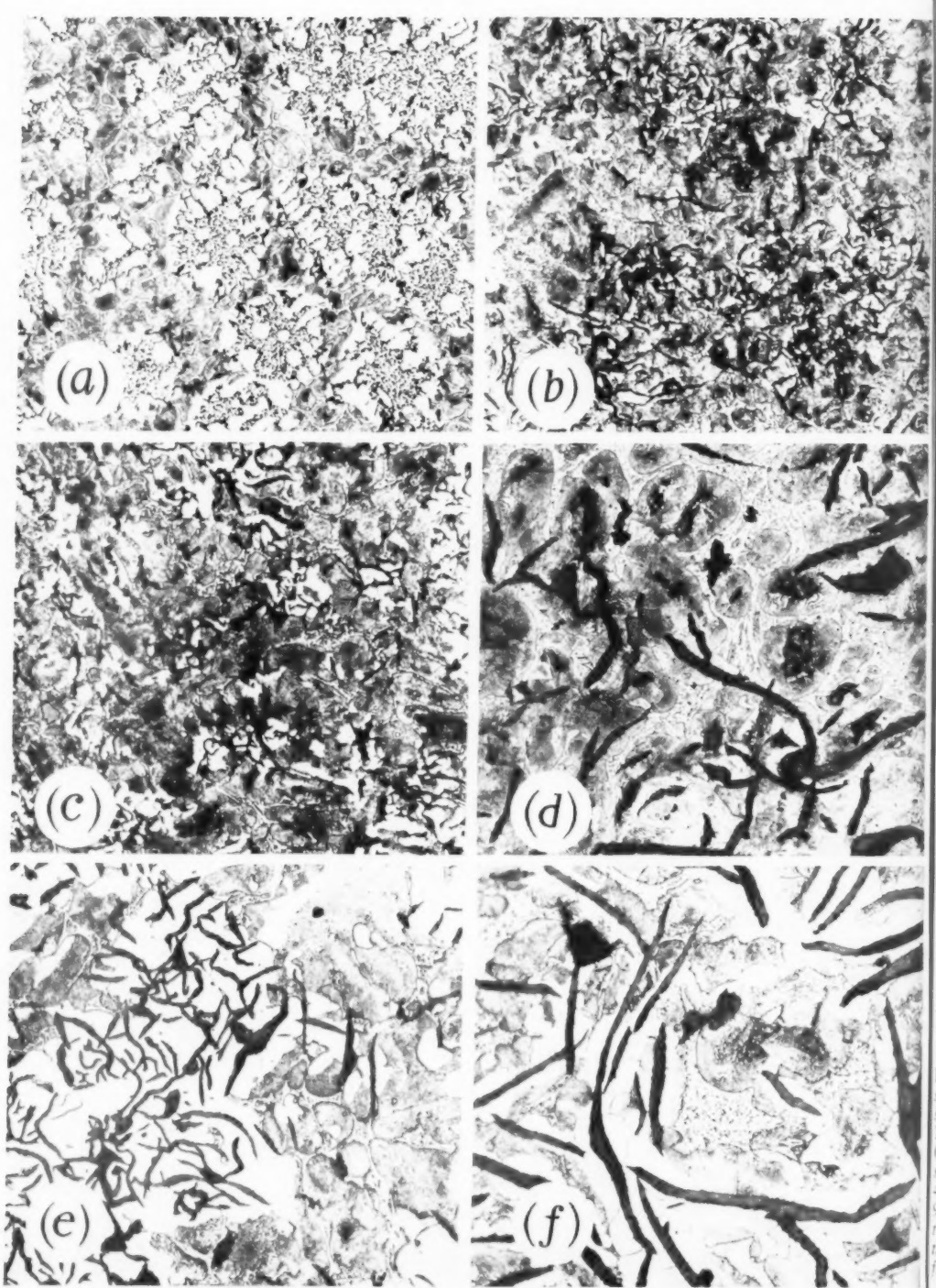


FIG. 9.—*Tensile and Vickers hardness results on unalloyed (Mark I) static die-cast stick.*

the normal operating speed, as thermal equilibrium is attained, periodic additions of liquid metal being made to the crucible as required. Starting up a continuous casting machine successfully, requires considerable skill and attention to detail. Satisfactory machine operation involves control of six variables, which must all be balanced so that the solidification occurs in a controlled manner, in the appropriate part of the die-cavity. These are: (1) rate of movement, (2) duration of movement, (3) dwell period, or time between the strokes, (4)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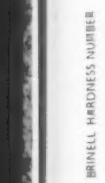

FIG. 11
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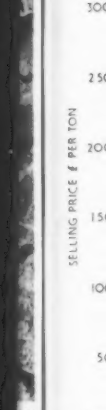

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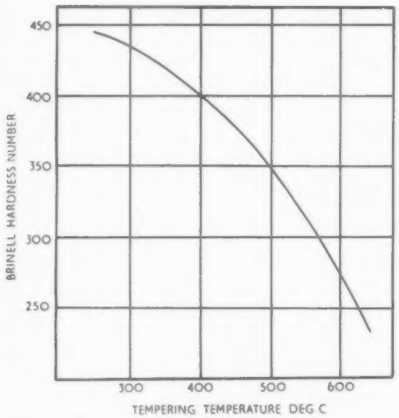


FIG. 11.—*Influence of temperature on hardened nickel/chromium alloy cast-iron (Mark III).*

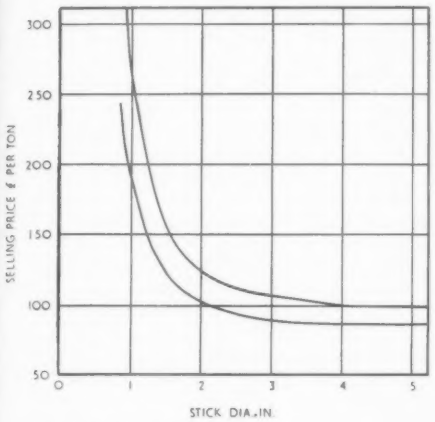


FIG. 12 (*above*).—*Trend of selling prices of Mark III (upper curve) and Mark I (lower curve) proof-machined cast-iron stick.*

FIG. 10 (*facing page*).—*Microstructure of continuously- and static-die cast Mark I stick. The figures show the outside (on left) and centre (on right) sections of 1½-in. dia. bar (top), 4¾-in. dia. bar (centre), and 9-in. dia. bar (bottom). The two smaller sizes are from continuously cast- and the 9-in. from static die-cast stick.*

temperature of liquid metal introduced into the crucible, (5) rate of heat input into the furnace from the burner, and (6) rate of flow of cooling water; this governs the chilling effect of the die on the metal.

If the solidification zone is allowed to move too far towards the outer opening of the die, the thin outer solid shell of metal may fracture, and all the liquid metal run out of the furnace. This could happen if the bar was extracted too rapidly, or a very-high metal temperature was used. At the other extreme, the solidification zone may move back down the die, almost into the crucible, and cause a fracture in the solid bar, or a stoppage of the machine.

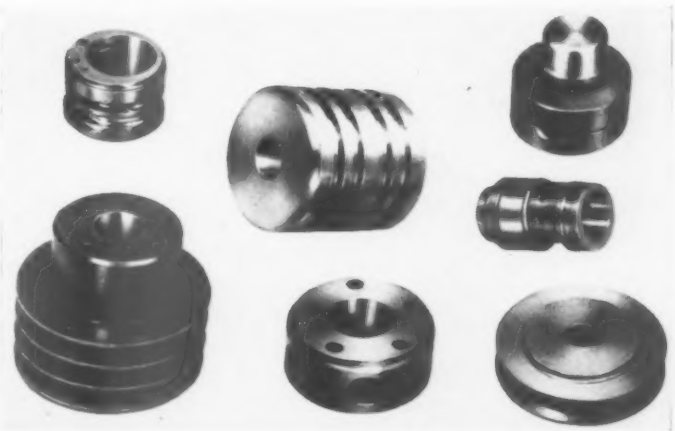
Sizes

As with most metallurgical processes, there is a certain amount of latitude permissible in the operating variables. This latitude increases with increasing bar diameter, but is at a minimum during starting, such that a limit is set to the minimum diameter of bar which can be produced, with this type of equipment. In practice, bars of about ¾-in. dia., and smaller, are extremely difficult to cast, and cannot be regarded as a commercial proposition. At the other end of the scale there does not appear to be any technical limitation to the largest size of bar which can be produced, and the matter becomes one of economics, as to whether the demand for the larger size of bar will warrant the capital outlay involved in constructing bigger machines. We currently cast bar up to 4¾-in. dia., and hope to extend this to about 6-in. dia. by the end of the year; but the demand falls off so much with the larger sizes that this increased size is likely to remain our "ceiling," for many years to come.

Machining

Bar up to 3½-in. dia. is cut-off in 10- to 12-ft.

FIG. 13.—*Group of typical finished components machined from cast-iron stick.*



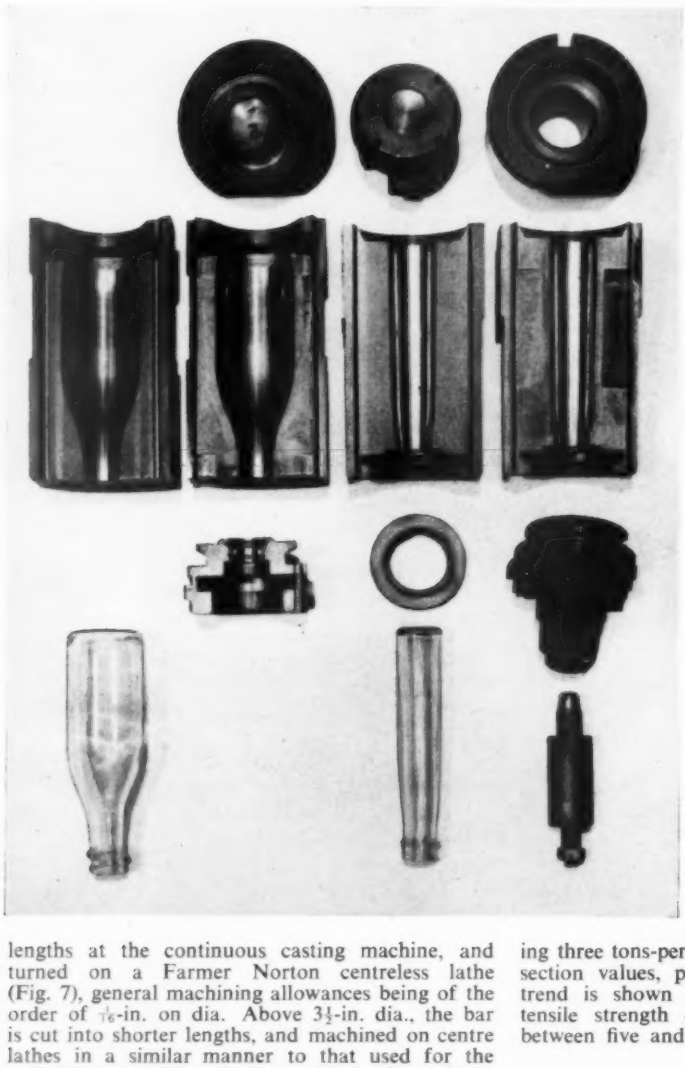


FIG. 14.—*Group of cast-iron mould-pieces used to make a small bottle. (Courtesy Beanson, Clark & Company Limited.)*

lengths at the continuous casting machine, and turned on a Farmer Norton centreless lathe (Fig. 7), general machining allowances being of the order of $\frac{1}{16}$-in. on dia. Above 3½-in. dia., the bar is cut into shorter lengths, and machined on centre lathes in a similar manner to that used for the static-die-cast stick. A close examination of the freshly machined surface, confirms the complete absence of defects, so characteristics of this continuous-casting process, and the bar is cut into shorter lengths, suitable for handling and despatch to the customer.

Specification and Properties

Two grades of iron are in regular production in both static die-cast- and continuously-cast- form. By far the greatest quantity, is cast in an unalloyed medium-phosphorus grey-iron intermediate in strength between BS.1452 grades 12, and 14. Smaller quantities of an alloy iron, containing nickel and chromium are made for customers who require a higher quality material. This alloyed iron, which conforms to BS.1452 grade 17, is harder and stronger than the unalloyed grade, and is suitable for quenching and tempering treatments, which enhance the strength and wear resistance still further. Typical properties and analysis for the two materials in the continuously-cast-form are given in Table 1.

The figures quoted are typical of stick in the order of 2-in. dia. As the size increases, both materials exhibit the normal section sensitivity characteristic of grey-cast-iron, and the strength falls. Figure eight shows how tensile strength varies with the diameter of continuously-cast bar, and provides an interesting comparison with the specification requirements of the relevant grades of B.S. 1452. Incidentally, test bars taken from adjacent to the outside surface, gave results averaging three tons-per-square-in. higher than the centre-section values, plotted in the graph. The same trend is shown in figure nine, which gives the tensile strength of Mark I static-die-cast stick between five and nine in. dia.

Microstructure

In the continuously cast condition the unalloyed iron (Mark I) is mainly pearlitic in structure, with a certain amount of phosphide eutectic in network distribution. Large amounts of ferrite are sometimes present at the outside of small-diameter bars, and traces of ferrite may be found associated with the graphite flakes in the centre of the section.

TABLE 1.

Grade.	Type.	Tensile strength.	Brinell hardness.	T.C.	Si.	Mn.	P.	Ni.	Cr.
Mark I ..	Unalloyed..	12 to 14 tons per sq. in.	200 to 230	3.3	2.0	0.5	0.8	—	—
Mark III..	Ni-Cr ..	14 to 17 tons per sq. in.	230 to 280	3.3	1.7	0.5	0.5	1.4	0.4

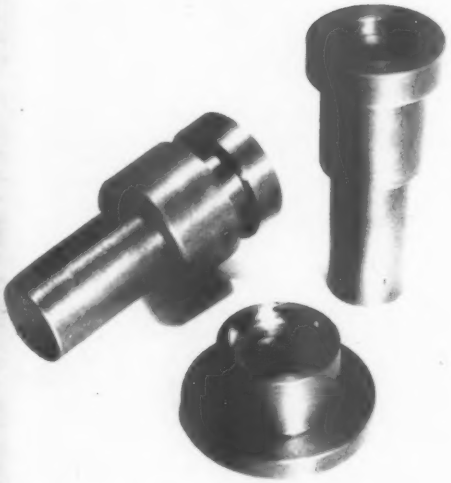


FIG. 15.—*Semi-finished plugs and thimble, machined from continuously die-cast stick. (Courtesy Johnson, Radley & Sons, Limited.)*

Static-die-cast Mark I stick has a mixed ferrite/pearlite structure showing rather more than 50 per cent. ferrite at the outside, and *vice versa* at the centre. The graphite flakes are finer towards the bar surface than at the centre, and become generally coarser with increasing diameter. This is shown in the photomicrographs (Fig. 10) and correlates with the effects on tensile-strength, of section size, and test-bar position referred to previously. The nickel/chromium alloy iron (Mark III) is essentially pearlitic in both the continuously-cast, and static-die-cast conditions; but is otherwise similar to the unalloyed iron (Mark I) in graphite and phosphide eutectic distribution. When lower hardness is required, for ready machinability, the unalloyed iron may be annealed. This results in an essentially ferritic microstructure, with reduced strength and wear resistance. Higher hardness levels up to 400 to 450 Brinell can be obtained by oil-hardening the nickel/chromium alloy-iron, and are used for parts such as gears, cams, or rollers, which are subjected to severe abrasion, or indentation forces in service. Figure eleven shows hardness varying with tempering temperature. After quenching and tempering, the alloyed iron has a "sorbitic" or tempered-martensite type of matrix structure, rather similar to that of the hardened low-alloy steels.

FIG. 16.—*Five used parts utilized in glass-bottle manufacture showing mechanical damage. (Courtesy Beatson, Clark & Company, Limited.)*

Availability

Cast-iron stick, of both ordinary and alloy grades, manufactured by the continuous-casting process is currently available from $\frac{1}{2}$-in. dia. up to $4\frac{5}{8}$ in. dia., and is normally supplied in random lengths of 20 to 26 in. Longer lengths can be supplied, but the maximum possible length is limited by machining capacity and varies with diameter as shown in Table 2.

TABLE 2.

Machined diameter.	Normal form of supply.	Maximum machined length.
$\frac{1}{2}$ in. to $3\frac{1}{4}$ in.	20 in. to 26 in.	10 ft.
$3\frac{1}{2}$ in. to $4\frac{5}{8}$ in. ..	20 in to 26 in. ..	6 ft.
$4\frac{3}{4}$ in. to 11 in. ..	20 in. to 26 in.	5 ft.
11 in. to 15 in. ..	20 in. to 26 in.	26 in.
18 in.	As required	18 in.
24 in.	As required	12 in.
32 in.	As required	10 in.

Although with the development of the continuous-casting process we have been able to supply long lengths of proof-machined stick, in the smaller sizes for several years, the main trend of sales has continued along the pattern set during the period when only static-die-cast stick was available, and the majority of material is still despatched in

Properties of Cast-iron Bar

the standard 2-ft. lengths. Few customers have taken advantage of the possibility of reducing costs on quantity production, by machining very long lengths on bar-automatics, or capstans fitted with collet chucks. Above 4⅞-in. dia. up to about 15-in. machined diameter, stick is made by the static-die-casting process and again supplied in 20 to 26 in. random lengths. Greater lengths are sometimes called for, but tend to be limited, in the larger diameters, by considerations of weight, and available mould stocks. Hollow sticks, or cored bars, above 10-in. dia. are sometimes made by casting in static dies, and using central oil-sand cores. Production by this method is rather restricted, as this class of work is more in the field of the centrifugal-casting process. Incidentally, the Author's company can supply most types of cast irons, steels, and high-alloy materials, as centrifugal castings, in a very wide range of sizes.

Price

The price structure for cast iron stick is quite well established, and averages 9d. per pound weight for the proof-machined product in the ordinary iron grade, the nickel/chromium alloy iron being about 20 per cent. dearer. As might be expected, production costs increase for the smaller diameters, and are reflected in the selling price as shown in figure 12.

Applications

Cast iron stick is widely used in the textile- and general engineering- industry, for making components such as bearings, pulleys, cams, spindles, colletts, gears, bushes, and rollers. A group of typical finished parts machined from cast iron stick can be seen in Fig. 13. The main advantages over alternative methods of manufacture, such as single sand castings, and sand cast stick, are freedom from a hard skin and the consequent improved machinability, together with a much greater reliability, and absence of casting defects. Blowholes, inclusions and shrinkage cavities are rarely found in iron bar produced by the continuous casting process. Savings in cost arise from reduced machining time, and fewer rejections of finished parts, and are most evident with components where the processing cost is high in relation to the raw material cost.

Cast Iron in the Glass Bottle Industry[5, 6]

The manufacture of glass bottles involves forming plastic glass at temperatures in the order of 1,250 deg. C. by blowing it into suitably shaped mould cavities. These operations are normally carried out on automatic machines, at high rates of production, and cause the mould parts to be subjected to most arduous working conditions. It is said that a good mould material must possess the following qualities:—(1) ready machinability, (2) resistance to scaling and corrosion, (3) ability to take and retain a good surface finish, (4) dimensional stability under repeated heating and cooling, (5) resistance to thermal cracking, (6) resistance to wear, (7) good thermal conductivity.

All these properties are possessed to some degree by grey cast-iron, so that it is not surprising that, despite the metallurgical developments of the recent decades, the majority of mould parts for bottle manufacture are still made from cast iron. Relatively low material and machining costs, coupled with adequate service life, are primarily responsible for the persistance of cast iron moulds in an age when so many elaborate heat resisting materials, have been introduced in other fields. Probably the most important single requirement of a mould iron is closeness of grain, or ability to take a good polish, and resist chipping, at sharp corners.

Examples

Figure 14 shows a typical array of the mould parts required to make a small bottle. On the left-hand side of the photograph, are the pieces active during the initial stage of converting the "gob" into the preliminary shape, while on the right, are the parts which form the finished bottle. The mould halves proper, which give the main external shape to the finished bottle, are subjected to the most-severe thermal-shock in service. These are usually machined from shaped-iron castings made in sand moulds, incorporating chills, to give a densening action at the working face. It is not usual to make moulds of this size from cast-iron stick, due to the expense involved in machining from the solid and the risk of structural looseness towards the centre of the section. In figure 14 the lower three items (funnel, stopper and bottom plate), are sand castings. The neck rings are made from D-section static-die-cast stick, while the neck-location ring, plunger, and skirt, are machined from continuously-die-cast stick. Other examples of bottle mould components manufactured by machining from continuously die-cast stick are illustrated in Figs. 15 and 16, which show, respectively, three-part machined pieces, and a group of five used parts taken out of service, mainly for mechanical damage resulting from faulty machine alignment. Given a fine enough grain and reasonable machinability there are very few "quality" troubles associated with the use of cast-iron stick for mould components. In fact, the majority of plungers, sleeves, and skirts, remain in service until either, mechanically damaged, or the complete mould assembly is taken off, because of deterioration on the main mould faces. Failure due to oxidation and thermal cracking is rare with the small ancillary parts normally made from continuously-cast stick, these items being subjected generally to some of the least-arduous mould conditions, and likely to show burning, or crazing, only after such periods as are likely to cause marked deterioration elsewhere, in the mould assembly.

Material

In general we find that glass bottle manufacturers select the nickel-chromium alloy iron (Mark III) for mould parts in preference to the unalloyed iron (Mark I). While this may arise from the search for closeness of grain conferred by alloying elements

it is also advantageous from the point of view of heat resistance. Sometimes the unalloyed iron will be used for less critical parts such as location rings which do not come into contact with the glass. It must be admitted that the normal quality of cast-iron stick we supply, in sizes above about four in. dia., is not really as close grained in the centre regions, as would be desirable for mould manufacture. This is the reason why the majority of our sales to the glass bottle industry consist of stick under about three in. dia., and the examples shown in the photographs are mainly small parts. Recognizing this deficiency in our material, and being under constant pressure from bottle manufacturers to develop a close-grained cast-iron, specifically for mould parts, we have made several experimental melts in varying analyses, and finally selected a low phosphorus unalloyed composition (G.B.M.1) for trial runs, containing the following elements: T.C. 3.45, Si 2.0, Mn 0.6, P 0.3 per cent. It was hoped that reducing the phosphorus content would improve thermal-shock resistance and machinability, while contributing to the all-important closeness of grain. Samples of this material have been distributed to many users in the bottle trade, for comments on machining quality and service life. Initial reports suggest that while machinability appears to be improved, the structure is little, if any, finer than the standard grades of iron. No information is available yet, on resistance to scaling, and cracking under service conditions.

Acknowledgements

Thanks are expressed to the directors of Sheepbridge Alloy Castings, Limited, for permission to publish this paper, and recognition is made of the past and present employees of that company, and Messrs. Harold Andrews Sheepbridge, Limited, whose efforts resulted in the successful commercial development of the closed-system continuous-casting technique for the production of grey-iron bar. The Author is particularly indebted to Mr. D. Yeldham of Sheepbridge Engineering, Limited's Chesterfield research laboratories, for assistance with the metallographic work.

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AT THE SHEFFIELD EXHIBITION of furnaces, machinery and equipment for heat-treatment processes, to be held November 8, 9 and 11, the Morgan Crucible Company, Limited (Stand No. 17), will be displaying a complete range of Crusilite furnace-heating elements, and furnaces heated by the elements will be shown in operation. Refractory materials and other products of the companies in the group will complete the display.

German Foundrymen's Technical Association

Annual Meeting in Düsseldorf

The *Verein Deutscher Giessereifachleute* (the German foundrymen's technical association) is holding its fifty-first annual meeting in Düsseldorf from November 9 to 11. Proceedings will commence on the Wednesday with a meeting of the General Council of the Association, followed by meetings of Council with chairmen of the various technical sub-committees.

On the Thursday, technical sessions will be held simultaneously in two lecture halls. Professor R. Spolders (Witten), is to open the series to be held at the Robert Schumann Hall and Director P. Schiegries (Hilden) will address the assembly at the Small Congress Hall. Papers to be presented are as follows:—

(1) "Corrosion Behaviour of Graphite-containing Iron-carbon Casting Alloys," by Dr. A. Wittmoser (chairman, Professor Roesch). (2) "Relationship between Properties of Coke and its Performance in the Cupola," by Dr. A. Dahlmann (chairman, Professor K. Löhberg). (3) "Feeding of Castings according to Constitution," by Professor Patterson and Mr. S. Engler (chairman, Dr. H. Siepmann). (4) "Microporosity and Hot-tearing Tendency of Magnesium/Aluminium Alloys," by Professor J. Czikel and Mr. J. Weller (chairman, Dr. K. E. Mann). (5) "Hot-strength of Aluminium and Magnesium Casting Alloys," by Mr. H. Nielsen (chairman, Dr. G. Gürtler). (6) "Locking Devices in Pressure-die-casting Machines," by Mr. W. Venus (chairman, Mr. G. Lieby). (7) "Pearlitic Malleable Cast Iron," by Mr. R. Opitz (chairman, Professor Roesch). (8) "Basic Relationships in Cupola Melting," by Professor Patterson and Dr. F. Neumann (chairman, Professor Jungbluth). (9) "Mechanization of Moulding and Fettling," by Mr. H. Bergmann (chairman, Mr. O. Reif). (10) "Machining of Light-metal Casting Alloys," by Mr. H. G. Bech (chairman, Dr. P. Wiest) and (11) "Casting of Copper/Chromium Alloys," by Dr. W. Nielsch (chairman, Mr. E. Weisner).

On the last day, Professor R. Spolders, president of the VDG, will address members at 3 p.m. in the Robert Schumann Hall, guests being admitted at 4 p.m., when the gathering will be entertained by the orchestra of the Bach Society, Düsseldorf, conducted by Prof. J. Neyses, playing a symphony by Franz Beck. The president will then welcome the assembly and present honorary awards to members. A performance of Mozart's music will follow and finally the Minister of Culture for the province of North Rhine-Westphalia, Mr. W. Schultz, will deliver the festival lecture entitled "Possibilities and Limits of a State Cultural Policy." The meeting concludes with the president's closing address.

BITA's Materials Handling Competition

The British Industrial Truck Association is again offering as first prize in its annual materials handling competition a place at the advanced materials handling training course to be held at Lake Placid, USA, in June, 1961. In addition there will be cash prizes of £25, £15, and £10. Candidates, who must be sponsored by their employers, will be required to write a paper on one of three subjects dealing with materials handling. Requests for full particulars of the competition, the Lake Placid course and application form should be made to the secretaries, British Industrial Truck Association, 94/98, Petty France, London, S.W.1.

Notes from the Branches

Sheffield

Monday, October 3, was president's night for the Sheffield branch of the Institute of British Foundrymen, when Mr. J. H. Pearce, the new president, received the chain of office from the retiring president, Mr. J. Richardson. An added attraction was the awarding of special prizes to two apprentices who had been successful in gaining the highest marks respectively in the patternmaking and moulding competition organized by the branch to commemorate its jubilee last year.

Earlier in the evening, the branch council entertained to tea all the prizewinners, together with foremen and training officers from the firms which had taken part in the competition. The chairman of the apprentices' sub-committee, Mr. E. Ayres, was unfortunately prevented from being present by a business commitment which took him out of the country. A letter from Mr. Ayres, however, was read by Mr. R. Horton, treasurer of the sub-committee, in which he thanked the firms which had collaborated and the 196 young men who had competed. Mr. Horton and the council associated themselves with this message, and thanks were also tendered to the judges and organizers of the competition. Mr. Horton said he hoped that all the successful craftsmen present would give attention to the need to obtain further education if they wished to progress up the management ladder.

Presentation of Awards

The president himself then thanked the organizing committee and presented the certificates of merit and prizes. For the eight sections of the competition—junior and senior classes for patternmaking, and casting in steel, iron and light-alloys—the first prizewinners received £7; the second, £5, and the third, £2 10s. Of the prizewinners, no fewer than nine were associated with Newton Chambers & Company, Limited, Thorncliffe, Sheffield.

The successful competitors were then invited by the president to the dinner and social evening which followed. (A list of prizewinning competitors was printed in the JOURNAL, May 12, p. 596.)

Dinner

The procedure of holding an informal dinner as the first meeting of the session is customary with the Sheffield branch, and this year's function held in the restaurant of the Ecclesall Road Co-operative Society was as well attended as usual.

Mr. J. H. Pearce, after receiving his chain of office from the retiring president, presented a past-president's badge to Mr. Richardson. He then announced the winners of the apprentice competition and asked them to stand to receive an ovation from the entire gathering. Next came the presentation of the two special prizes. Mr. T. E. Johnson, the best patternmaker apprentice, was unable to collect his prize of a woodworkers' plane, because he was in Barcelona representing England in the international competition, so his foreman instructor, Mr. F. Blackburn, of the Appleby Frodingham Steel Company, received it for him. A set of moulders' tools was presented to Mr. J. Spooner who had achieved the highest marks in the moulding section of the competition.

Mr. Pearce's Address

In his address, Mr. Pearce spoke of the importance of personal service. He said every man was a debtor to his profession, and voluntary work on behalf of the foundry industry was very rewarding. Attendance at lectures and taking part in the discussion of papers afforded a liberal education even after formal training was finished. He hoped the new generation would remember the achievements of their predecessors in the profession. "We must always take a real interest in one another," he added, "management must respect the men and all should take pride in the dignity of work, whether as a craftsman or as a man of science." Mr. Pearce concluded by referring to the annual works' visits day of the Institute, on which occasion the branch would be the hosts. Musical entertainment followed the close of the formal proceedings.

At the dinner of the Sheffield branch is shown (left) Mr. J. H. Pearce, the new branch president, presenting Mr. J. Richardson with his past-president's badge, and (right) Mr. Richardson congratulates Mr. Pearce and invests him with his badge of office. Watching the ceremony are a group of branch officials and Mr. L. R Evans, foundry superintendent of the English Steel Castings Corporation, Limited.

INTERNATIONALER GIESSEREI-KONGRESS
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Zürich Diary . . . By A. R. Parkes

Abstracts of Congress Papers presented September 19 to 24

A total of 22 papers were preprinted at the Twenty-seventh International Foundry Congress, held in Zürich from September 19 to 24, of which six were in English, three in French and 13 in German. A subject analysis shows that eight papers deal with cast iron and six with general practices; light alloys, steel and moulding subjects each have two papers devoted to them and plant and copper-base founding one each. What follow are abstracts of the papers and discussions presented following those dealt with in the first section of the "Diary."

(*continued from page* 470)

Technical Sessions

The technical sessions of the International Foundry Congress took place on the Monday (afternoon), Wednesday (all day) and Friday (morning) of the week spent at Zürich. Those papers presented during the first session have already been reviewed in the first section of this "Diary" (October 13 issue of the JOURNAL). Synopses of all except three of the papers presented during the remaining sessions are given below, together with short extracts from discussions during which the writer was present. The remaining papers, one from a Russian source—for which no preprints were available, one of Japanese and one of Hungarian origin, will be reviewed in the final section of the "Diary."

New Method for the Quality Control of Cast Iron by Ultrasonic Testing

By A. Lehtinen (in German)

Synopsis

By using the ultrasonic impulse method in studying elastic properties of cast iron, valuable conclusions for the different properties of cast iron can be made. Up to the present, studies have been confined to castings at room temperature, preferably because the transducer does not stand for higher temperatures. In this work, a method is reported by which ultrasonic examination can be extended to hot and even liquid cast iron. In this method, a cooled steel rod is used (on the upper end of which the transducer crystal has been fastened) as a conductor of ultrasonic impulses into the liquid iron. The lower end of the rod has been heated in a liquid alkali melt before testing, in order to get a good acoustic contact. Thus, it is possible to follow continuously the change of the sound velocity *versus* temperature from the liquid condition through the freezing zone to room temperature.

Problem of Evaluating Cast Irons and the Rôle of Secondary Grain-structure

By A. Collaud (in French)

Synopsis

The tensile strength of grey cast iron is usually regarded as a criterion for high quality and as was shown some years ago, this criterion is closely connected with the tenacity, and the tenacity is inversely proportional to the Brinell hardness at a fixed value of the tensile strength. According to these ideas, W. Patterson has introduced the notions of the degree of normalization, relative hardness and index of quality. He intends to express by these notions that the quality of grey cast iron with a definite carbon equivalent value improves when the tensile strength rises and the Brinell hardness decreases. It has been shown that the so-called index of quality is nothing more than the coefficient a from the equation $\alpha = \frac{\sigma B}{E_{II} \cdot \Delta} \cdot 10^{-5}$ which has been established earlier. Two series of grey cast irons which were produced under very different metallurgical conditions were studied with the following result—As long as the melting conditions of these commercially-produced types of grey cast iron were carried out correctly, the coefficient a has roughly the value of 1.05. The value may be increased if certain inoculants are applied. Thus, an improvement of the quality of grey cast iron is obtained. In this paper, it is shown that this improvement can be derived from the increase of ductility and tenacity of the matrix. This observation encouraged the author and his colleagues to study the behaviour of the matrix and to consider it in a bivariant system. The content of combined carbon as well as the distance between the lamellæ in a pearlitic structure must be considered. The properties of grey cast iron can be understood more clearly by this approach.

In order to show the influence of the ductility on the matrix, an increasing ferritization of several

Stage and part of the audience at the opening ceremony (taken from right-hand side of the Congress Hall). At the long table are seated the delegates from the 22 nations represented on the International Committee of Foundry Technical Associations.

unalloyed and alloyed types of grey cast iron was produced by annealing at different temperatures. It was found that Patterson's index of quality is decreased by this treatment and that the coefficient increases corresponding to the shock resistance of the material. These observations enabled new types of grey cast iron to be developed which have a higher shock resistance than the types used previously.

Determination of the Linear Velocity of Combustion in the Combustion Zone of the Cupola

By C. Podrzucki (in German)

Synopsis

The linear velocity of the combustion of coke is defined as the velocity with which the combustion surface advances towards the inside of the burning lump of coke. This velocity is the main factor governing the height of the combustion zone in the cupola and has been determined by a general formula which the author quotes, relating the actual volume of blast, the average diameter of the lumps of coke, together with a correlation coefficient. Initially, based on theoretical considerations and the results of combustion tests carried out in an experimental shaft-furnace, formulae were derived defining the relationship between the linear velocity of combustion and the velocity of gases flowing through the layer of coke (corrected to NTP), the oxygen concentration in the blast, the blast temperature and the average temperature in the combustion zone. Coefficients were also introduced into these formulae to express the quality of the coke used, and the author quotes typical coefficients for the Polish foundry coke. The results of these last experiments permitted the estimation of the coefficient for the first formula to be determined. Finally, the linear velocity of combustion computed with the aids of these formulae was shown to give quite a good correlation with values measured during the operation of actual cupolas. The author concludes by stating that the application of these formulae will enable foundry metallurgists to deduce changes of combustion velocity and therefore changes of the height of the melting zone in the cupola—a matter of particular importance when considering the operation of the (British) balanced-blast design of cupola incorporating several rows of tuyeres. He also expresses the opinion that the value for the combustion rate will be useful in judging new kinds of cupola fuel introduced into the foundry industry.

Studies on the Decomposition of Cementite

By R. Mitsche (in German)

Synopsis

In this paper, the general situation in the field of cast-iron research is outlined and some impor-

tant factors which influence structure and properties of cast iron, but are not yet fully understood, are pointed out, *e.g.*, heterogeneity, slag clouds, influence of pressure. The formation of graphite in cast iron is not yet fully cleared, at least there does not exist a universally-accepted theory. Two items seem to be especially still under discussion—the formation of very fine eutectic flake (acicular) graphite and the nucleation and growth of spheroidal-graphite. In this paper, an experimental approach is described towards the solution of the two problems mentioned. The decomposition of cementite during heat-treatment in the solid state has been studied as well as the new formation of cementite when grey cast iron is remelted and cooled again. The following results have been gained: In no case has fine flake graphite been formed by direct or indirect decomposition of cementite and this result confirms the theory of direct formation of this type of graphite from the melt. Comparing the behaviour of specimens of very different thickness when heated in the solidus temperature range with the graphite formation on free surfaces under equal temperature conditions, the influence of pressure has been demonstrated. The direct observation of graphite formation at high temperatures with the aid of a specially-developed device has shown the possibilities, as well as the present limits, of this method. Furthermore, it has been shown that at least the first stages of graphite formation on free surfaces are very similar in untreated and in Mg-treated cast irons. A very useful method has been found in partial melting of samples of Mg-treated cast irons. With the aid of this "melt-etching" method, the coexistence of austenite crystals containing spheroidal-graphite centres with a liquid phase of fairly high carbon content has been shown.

Gases in Ferro-alloys

By B. Marincek and R. Limpach (in German)

Synopsis

This paper describes the determination of gases in ferro-alloys in a vacuum hot-extraction apparatus, working at temperatures of up to 2,000 deg. C., which is equipped for the recording of gas-evolution graphs. The results obtained show that the gas content of different grades of ferro-alloys can vary considerably. The gas contents, which are very high on occasions, depend on the composition of the ferro-alloys, their origin, their grain fineness (finer fractions correspond with higher gas contents) and their storage (generally the gas content increases by storing). Based on the results obtained, conclusions are drawn for founders who use ferro-alloys and the sampling of ferro-alloys for the gas determination is discussed.

Grain Refinement of Cast Metals

By G. W. Form, G. K. Turnbull, G. Gould, H. Merchant and J. F. Wallace

Synopsis

The general principles underlying solidification of metal melts are summarized as these pertain to grain-size control. This summary is subsequently used to demonstrate how a fine equiaxed as-cast structure may be achieved and to illustrate the important parameters which must be controlled in any attempt to refine the grain obtained on solidification. Successful methods are those which reduce the work of nucleation and also interrupt continuous growth of crystallites existing in the melt.

Results obtained in recent studies on the effect of mechanical vibration of numerous metals, as well as inoculants and additions for the purpose of grain-growth restriction in copper, grey iron and steel, are presented. These results are interpreted on the basis of the underlying principles responsible for the grain refinement observed.

Discussion

After the author presenting the paper at Zurich had given his lengthy abstract which was translated for the benefit of listeners into the three languages used at the Congress, he concluded that much further work was needed on this subject. The theory of the presence of a solid nucleant in a melt appeared to work out in practice, but sufficiently close control of all the variables involving refinement was not always possible.

The first contributor to the discussion asked if, with inoculation, there was not some risk that dissolution of the inoculant itself might occur. To this, the author replied in the affirmative, but stated that the circumstances of the addition and the nature of the inoculant needed to be varied to avoid undesirable side-effects. Professor Wittmoser, from Germany, then asked what were the characteristics

Tables at the Annual Banquet on the Wednesday in Zürich at which representatives of the UK foundry industry attending the Congress were prominently placed.

Impromptu group photograph of Congress participants at dinner. Well-known personalities at the centre table are (left to right) Mr. W. W. Maloney (general manager, American Foundrymen's Society), Mrs. Maloney, Mr. and Mrs. Shotton, Mrs. Everest, Mrs. Lambert and Mr. G. Lambert (IBF secretary).

of the vibrations which had been applied. He had read a useful United Kingdom report on the application of vibration to solidifying metals, he added, and done some work himself, but he would be pleased to learn how the vibration applied by the authors had been initiated. To this, Mr. Form (who had presented the joint paper) replied that a vibration of 60 cycles per second had been applied to metal contained within a crucible by using an electromagnet. He thought the frequency effect was not so important as the need to impart energy to the metal. Dr. R. Ziegler of Austria asked what was the rôle played by the dimensions of the nucleii in this work of grain refinement. To this, the speaker replied that he and his colleagues had done no work on this particular point and so if they replied they would only be able to generalize. In answer to the final question as to the effect of surface tension, Mr. Form said this had not been studied.

Study of Metal Flow in Gating Systems as an Aid to Casting Technique

By M. Bednarik (in German)

Synopsis

The object of this paper is to show the possibility of employing the model technique and the theory of similarity for the elaboration of directives for the optimum design of gating systems. It was shown that the model technique using transparent models and the model liquid with the application of the theory of similarity permits the establishment of general principles for the design of gating systems. The results are valid only for the hydraulic point of view of the pouring process.

In the part concerning the effectiveness of slag-traps, the possibility of removing the impurities in the gating system was investigated. The dependence of the effectiveness of slag-traps on the size of the impurities and on the stream velocity in the slag-trap was examined. The system cast iron/slag was replaced by the system water/cork. It has been found that the effectiveness of the slag-trap is proportional to the root of the size of impurities whereby the applicability of the hydraulic equations for the determinations of the best construction of the slag-traps was confirmed. Within limits, slag-traps possess a good efficiency with a stream velocity between 28 and 40 cm. per sec., according to the size of the impurities introduced. By using whirlgates for the entrapping of impurities, the effectiveness of the slag-traps may be improved by 30 per cent.

In the following part of the paper, the model technique and the theory of similarity were used for securing a quiet flow of metal in a turbine-blade mould where there is a risk of coldshuts and of the entrapping of oxide films in the material of the casting. Based on the tests with transparent models and on the application of Froude's value, the velocity of the flow of metal in the ingates was determined, which still ensures a minimum agitation of the metal level—this waving exerts a detrimental effect on the wrinkling of the oxide films on the rising level of the metal and on entrapping of these films in the material of the casting. The comparison of the models operated with mercury and with water showed that the change of viscosity under the given circumstances has no influence on the relationships discussed.

Further Development of the "Buhrer" Moulding and Casting Plant

By W. Gotz (in German)

Synopsis

In this paper, the author describes the development of the "Buhrer" moulding and pouring plants by Georg Fischer, Limited, Schaffhausen. The first plant was installed in their malleable foundry at Schaffhausen in 1956, a second in their malleable plant at Mettmann in the spring of 1960, and the third is in course of erection in the company's malleable foundry at Singen a.H. The main features of the prototype plant are again mentioned in this paper, as too are operating experiences. The Mettmann plant, although greatly improved in design, is in principle the same as at Schaffhausen, *i.e.*, one three-station

moulding automat with three drag patterns and a second automat with three cope patterns. The author then describes the third plant, destined for the malleable foundry at Singen a.H., in detail. It comprises only one six-station moulding automat with three drag and three cope patterns. It is claimed that this latest design will lead to a further improvement in operating efficiency and with the considerably larger moulding flask, will result in a greatly increased output, as expressed in terms of the moulded flask area per hour. Furthermore, with a six-station unit, the capital cost will be considerably reduced.

Production of Pearlitic Grey Iron in the Electric Furnace

By N. G. Chakrabarti, U. K. Bhattacharya, B. K. Gupta and N. R. Mitra

Synopsis

In this paper, the method of manufacture is described of automobile components such as brake drums, cylinder-blocks and -heads, according to DIN specification GG-26 and medium as well as light castings from one base iron prepared from 100 per cent. steel charge in an electric furnace. The melting technique of the base iron and the range of chemical compositions and physical properties of these castings respectively were established first by carrying out experimental heats in the laboratory and then by the production of trial castings in the foundry. The authors also detail the metallurgical control that has been adopted for the production of castings with uniform machining properties. The paper details the development of the method of manufacture of pearlitic grey-iron castings for automobile components in the foundry division of the Tata Locomotive & Engineering Company, Limited. Hitherto, these castings were imported and when the decision was made to manufacture them was taken, it was stipulated that brake-drum, cylinder-block and -head castings would be made according to the specification indicating the upper limit of the phosphorus content at 0.15 per cent., tensile strength of a minimum of 26 kg. per sq. mm., Brinell hardness number of 180 to 220 and microstructure of randomly-distributed graphite flakes in a matrix of pearlite as per DIN specification No. GG-26. In view of the high phosphorus content of Indian pig-iron (0.35 to 0.45 per cent.) and coke (0.60 per cent.), the installation of either conventional or hot-blast cupolas for the production of high-duty grey iron was not feasible. The process was adopted therefore of manufacturing synthetic grey iron from an all-steel charge in an electric-arc furnace. Since no published literature was available on the method of melting grey iron in an electric-arc furnace on a commercial scale

A small section of the audience at the opening meeting showing, in particular, a few of the UK participants and their wives. It is estimated that over 1,000 were present.

Zürich Diary

from all-steel charges, trial heats were made from a 100-lb. capacity arc furnace in the laboratory to determine the physical and other properties of the iron, so that the information thus gained from experiments could serve as the basic guidance for taking up the manufacture of this iron on a large scale in the authors' foundry.

Mould Paints and Washes for Use in the Steel Foundry

By J. M. Middleton and P. G. McIlroy

Synopsis

The influence of a number of variables on the room-temperature properties of mould paints have been studied. It has been shown in the paper that variations in the type and quantity of suspending agent present may have a marked effect on suspension properties, thickness of the coating applied and its susceptibility towards cracking and spalling during drying. Cracking during drying and subsequent shock heating is also affected by the type and amount of bonding agent present in the paint, the grain size and distribution of the refractory base, and the strength and thermal stability of the underlying sand. The authors discuss the various types of binders that may be added to improve the hardness of the dried paint film and it is shown that their choice is governed by the temperature to which the painted moulds and cores are subjected during stoving.

High-temperature and casting tests have shown that only very thick coatings of paints incorporating highly refractory materials, *e.g.* alumina, zircon, silica, etc., are effective in preventing metal penetration under high ferrostatic pressures. Thin coatings of such paints and thicker coatings of paints incorporating materials, *e.g.* olivine and titania, that react strongly with the sand have been found to offer virtually no resistance to metal penetration under such conditions.

Conclusions

In addition to the above summary, the authors listed the following conclusions to their paper and these provided an excellent basis for the short summary delivered at the meeting and left adequate time for discussion of the paper. It is therefore germane to reproduce these conclusions as a preface to the present writer's discussion notes, viz.:—

(1) Refractory paints containing large clay-additions had been shown to give excellent suspending properties. It had also been shown that such paints suffer from a serious disadvantage in that they are very susceptible to cracking during drying and baking processes. Similar observations had been made with certain proprietary paints, *i.e.*, the paints which showed excellent suspending properties were also very prone to cracking, whereas those which were inferior from a suspension point of view did not exhibit this surface cracking to the same degree. (2) The dry strength and ramming density of the underlying sand also affected the paint cracking tendencies during drying. If the dry strength or ramming density of the sand was low, the greater was the cracking tendency. (3) The specific gravity of a wash should be maintained above a critical figure, the actual value being dependent on the manner of application. By this means, not only is settling reduced, but equally important is the fact that less paint is absorbed by the sand. Consequently, thicker dry films that do not run down off vertical surfaces may be applied to a sand surface in a single operation. (4) Radiant-heat tests showed that all bentonite washes crack under such treatment, the degree of cracking depending on the amount of clay present. The composition of the sand had also been shown to be important—if the sand cracked under radiant heat, then any wash applied would also crack. (5) The tendency of a paint film to crack, both on drying and also on thermal shock heating, had been shown to be considerably reduced by replacement of the bentonite suspending-agent by sodium alginate. (6) The choice of suitable binder additions to mould washes ideally should be governed by the conditions of baking time and temperature. It was preferable that the addition should be kept as low as possible to minimize gas evolution and cracking during drying. (7) Casting trials suggest that only very thick, thermally-stable coatings of paints incorporating very refractory materials, *e.g.*, alumina, zircon, silica, magnesia, are effective in preventing metal penetration under high ferrostatic pressures.

Discussion

The first question arising was a mild criticism that the author had made little reference to graphite-carrying mould washes, the questioner asking why this was so. To this, Mr. Middleton replied that he had carried out a few tests on such washes (as recorded in Table 3 of the paper), but in general, poor results had been found. For example, a mould paint of graphite material 0.3-mm. thick had permitted quite high metal penetration. Thus, such materials were not recommended, although it was known that they were used sometimes in steel foundries. The next questioner, a Frenchman, said that his countrymen would agree that penetrant coatings 4- to 5-mm. deep had been successful on moulds for steel. Had the author any comments to make on this practice? Mr. Middleton said at the British Steel Castings Research Association and in field tests, investigation of this type of coating had been carried out (referring to Fig. 2 of the paper). For dressings of this type, the material needed to have quite a low viscosity and their tests using a very high ferrostatic pressure had given poor results except when thick paints were applied. A questioner from Norway asked if any results were available on the use of Olivine as a base sand in conjunction with an Olivine-base mould-wash. To this the author said he had only used Olivine dressings on silica-base

moulds, but such materials behaved well on olivine sands and were especially to be recommended when making austenitic manganese-steel castings.

Complimenting the author on his paper, a British contributor to the discussion said he thought the views put forward had "laid the bogey" of metal penetration fairly and squarely at the "door" of a poor mould or a poor wash. He then asked four questions as follow: (1) Was there any use of ethyl-cellulose materials as suspension agents? (2) What was the effect of metal temperature? (3) Had aluminium-sulphate been tried as a coating material? and (4) was work to be continued on alcohol-base dressings in respect of CO_2-process moulds or could a water-base paint for CO_2 moulds be provided? Here, the author called on his colleague, Mr. McIlroy, who replied to the effect that only one other successful suspension agent (a high polymer of acrilic acid) had been tried besides sodium-alginate, metal temperature had, of course, been taken into account; the answer to question No. 3 was in the negative, and to No. 4 in the affirmative with the added qualification that bentones (organic bentonites) were being tried as suspension agents, but this work was so far only available to BSCRA members. A further question arose as to what grain types of zircon or silica had been applied; was zirconium oxide or silicate used and did the zirconium compounds tend to separate out from the wash. To this, the author confirmed that zirconium silicate had been used; the higher specific gravity of this material did not make much difference, but possibly a little more suspension agent was needed. There was not much variation between the results with zircon- and silica-based paints, the real criteria was ability of the paint to produce a thick crack-free coating on the mould.

Application of Sodium-silicate/Bentonite-sand Mixtures without Gassing with CO_2

By M. B. Pajevic and J. Kruspel (In German)

Synopsis

Preparation of mould and core mixtures with sodium-silicate as a binder and treatments with CO_2 gas has given the foundry industry new possibilities for the rapid production of moulds and cores. However, the use of sodium-silicate with CO_2 treatment will only give satisfactory results if some other components are added to the mixture permitting it to break-up after the pouring of the metal. In order to make use of such mixtures without CO_2 treatment, experiments have been carried out to find the best suitable additions, which will provide conditions for a good moulding mixture—having a good bench-life, setting without drying in ovens and also permitting easy knock-out after casting.

In this paper, results of tests are given with mixtures of quartz sand and sodium-silicate, with and without further additions, as well as with and without CO_2 treatment. Results of these tests carried out in the laboratory and in the foundry have shown that mould and core mixtures can be made on the basis of quartz sand and sodium-silicate as a binder with the addition of bentonite and molasses and tar-oil, without treatment with CO_2. Such mixtures can be used for the manufacture of moulds for large castings because the mixture retains its suitability for moulding for a longer time. After pouring metal into these moulds, the mixture is very loose and is easily detachable from the casting.

Anisotropy and Properties of Cast Iron

By J. S. Abcouwer (In German)

Synopsis

For grey-iron castings made in sand moulds, the author contends that it is possible to put forward a mathematical solution of the problem of the transfer of both sensible and latent heat in terms of an indirect demonstration of heat flow for which an equation is derived. This is stated to be the same for the loss of sensible heat as well as for solidification and the austenite/pearlite transformation arrests and thus a formula for the total cooling period of a simple casting can be deduced. Applying this, it is demonstrated that the influence of increased time on cooling—and therefore on the structure and mechanical properties of castings of differing wall-thicknesses—depends on the ratio of volume and surface area of the casting. The undercooling of the autenite/pearlite change can be expressed as a physical-metallurgy problem, depending on time, and the hardness in a pearlite structure is said to depend on this interpretation. It is further postulated that three equations are sufficient to describe the mechanical properties of all kinds of simple, compact, unalloyed grey-iron castings and these take into account experimentally deduced relations published by Heller, Jungbluth, Collaud and Dubi (the numerical values corresponding with those published by Collaud and not contradicting De Sy's table). Use is made of the cooling curve and the three formulae to come to a better appreciation of mechanical properties in relation to section sensitivity, again confirming experimental results of Patterson and Iske. For more complicated castings, the hardness relationship put forward by Dubi and in more general terms by Collaud is quoted as the best means for interpreting the mechanical properties of metal within a given casting. A table is put forward for the standardization of unalloyed grey cast iron on the basis of the theories propounded.

Electric Melting in the Foundry

By E. Zingg (In German)

Synopsis

In recent years, there has been an extraordinary increase in the use of electric melting in foundries. Statistics on the rising output of electric steel show that there has been a threefold increase in the foundry production of electrically-melted steel, grey-iron and non-ferrous castings in the

Zürich Diary

last 20 years. The development of electric melting furnaces has been influenced by the growing demand for equipment capable of meeting the more stringent requirements of the foundry industry in respect of economy, hygiene and performance.

In this paper, the author deals with principal heating methods, types of furnaces and additional equipment such as swivel-covers, top charging, smoke and dust removal and inductive stirring equipment. He also discusses the essential reactions and solution processes inside the melt, between the melt and the furnace lining, the slags and gas atmposphere inside the furnace. The phenomena which occur in the zone of the electric arc and the possibility of influence by gaseous or solid substances suggest that the use of hollow electrodes is of advantage. Examples are given of the practical application of hollow graphite electrodes through which argon is passed. The material properties obtained by electric melting are shown by the values of strength specified and by several illustrations.

Comment

At the meeting where the above paper was presented, Dr. Zingg read a quite lengthy section elaborating the various points he had made and this occupied the whole of the time available. In particular, he quoted the kw hours per ton required to melt various foundry metals and said these varied to a not inconsiderable degree according to the type of equipment in which the electrical energy was applied to melting processes. These methods of converting electrical energy into heat and the several ways in which it could be applied in foundry melting equipment were next surveyed and finally, the author went on to discuss the suitability of electric melting when other treatment had to follow. In this case, the bath of metal in an electric furnace for example could be treated by the injection of calcium-carbide carried in a stream of nitrogen according to the Lindé method. In such a system when melting steel, sulphur could be reduced to a very low figure, rendering the metal very suitable for further treatment. This sort of treatments applied to other alloys, including non-ferrous metals, was also commented upon by the author, as was the pierced-electrode system which could be applied for the treatment of arc-melted metal. Electric melting, he said, also offered the possibility of producing very low-carbon steels as, for example, the 13 per cent. Cr, Cr/Ni steels, and also magnet steels. Copper-alloy melting could also be accomplished readily by electrical means, he concluded.

Graphite Formation in Cast Iron at High Freezing-rates

I. Minkoff and A. Goldis

Synopsis

In this paper, observations are made of the formation of graphite in cast iron at high freezing-rates. The procedure adopted was a modfication of the small-drop technique, using a water jet impinging on a stream of iron falling from a graphite-resistor furnace to obtain shot. The particles obtained were passed through sieves to sort them into size groups and selected samples from each group were then examined. The freezing rate of the particles is a function of particle size and hence examination of the particles according to decreasing size gives the solidification sequence as the freezing rate is increased. Particular attention was paid to the change in form of graphite from flake to spheroidal as the freezing rate increased and spheroidal-graphite formation predominates at a critical cooling rate in hypereutectic irons. The sequence of events during formation of spheroidal-graphite by quenching showed a distinct resemblance to that reported for the formation of spheroidal-graphite during freezing of treated irons. From the appearance of austenite in the vicinity of and surrounding the graphite nodules, it is concluded that spheroidal-graphite in quenched untreated irons forms direct from the liquid. The sequence of structures obtained indicated the increasing degree of undercooling occurring with decreasing particle-size. It is possible to treat the change from growth of graphite flakes to growth of graphite spheroids on the basis of the enhanced probability of nucleation of new faces as the undercooling is increased.

* * * *

As a general comment on the discussions in these technical sessions, the writer believes that more value would be obtained for those participating if the lecturer confined his address at the meeting to the "bare bones" of his paper and took up over this no more than one third of the time allowed. (After all, at Zürich, practically all the papers had been preprinted and were therefore available for study beforehand by those interested.) Such a procedure would give more time for discussion and in connection with the latter the writer still contends that he is reflecting a general opinion when stating that the type of rapid-fire question and answer on a practical basis (such as is British practice during technical meetings) is the best way of sustaining interest and extracting comparative information from the various speakers. The practice of submitting long perorations by way of discussion on somewhat abstruse aspects of the subject is deprecated. Such contributions would surely better feature as written contributions, meriting the considered replies of the author.

The sole advantage of having an author reading his paper at the meeting during International Congresses (or at least a lengthy abstract of it) lies in the instantaneous translation service. Theoretically if this service is well carried out, it permits listener to get the whole gist of the paper without having a written translation prepared beforehand. Even so, it might be better for the translators to be provided in advance with a typescript of the abstract which they could check against delivery.

(Congress Reports to be continued.)

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News in Brief

THE NEXT FOUNDRY EXHIBITION to be held in Germany is to take place in Düsseldorf from September 1 to 9, 1963.

CARDIFF OFFICE of George Ellison, Limited, has been transferred to new premises at 306 Western Avenue, Llandaff, Cardiff.

Mr. J. FAULDS has been appointed technical sales representative for Kelvin Hughes, Limited, in North and North Eastern England. His address will be: 110, Claremont Road, Whitley Bay, Northumberland.

RANSOMES, SIMS & JEFFERIES, LIMITED, Ipswich, have secured an order for a one-ton battery-operated mobile crane and ancillary equipment for the Bradford Valley goods depot of the North Eastern Region of British Railways.

TAP & DIE CORPORATION, LIMITED, which took over International Twist Drill, of Sheffield, earlier this year, is to donate to Sheffield University a scholarship in mechanical engineering. It will be awarded each year for the three-year course.

A WEST GERMAN SUBSIDIARY, AMF Deutschland G.m.b.H., has been set up in Wiesbaden by the American Machine & Foundry Corporation to handle distribution of the parent company's products in Europe. A manufacturing plant in the Federal Republic is also planned.

PROSPECTS FOR MANUFACTURING FARM TRACTORS in South Africa are being investigated by the (SA) Board of Trade and Industries. Relative merits of full manufacture, assembling tractors from parts supplied overseas, and the assembling of tractors from locally-manufactured parts will be considered.

WEST GERMAN AUTOMOBILE MANUFACTURERS, Carl F. W. Borgward G.m.b.H., of Bremen, plan a further expansion of their assembly plant near Buenos Aires, Argentina, where at present about 200 trucks are assembled per month. The organization still proposes to build an assembly plant in South Africa.

THE LARGE ENGINEERING WORKS of G. R. Turner, Limited, wagon builders, of Langley Mill (Derbyshire), is up for sale at £127,000 freehold. An official of the firm states that the sale is unlikely to cause any redundancy. "We hope to sell the firm as a going concern so that our staff of 300 will not lose their jobs," he said.

TO DEMONSTRATE how "Ilford Aids Productivity," Ilford, Limited, will be showing at the second Industrial Photographic and TV Exhibition, numerous types of cameras, plan-copying machines, dyeline copying equipment, projection printers, industrial X-ray film, etc. The exhibition is to be held at the Albert Hall, London, from November 21 to 25. Ilford's will be at stand No. 41.

MR. RONALD STEEL, chairman of Pickford Holland & Company, Limited, refractory goods manufacturers, Sheffield, has stated that the works are operating at full capacity. "There is a feeling of confidence among our customers that steel output will be maintained for the next few months, at any rate. This should enable us to keep up the increased sales, upon which our profits depend," he says.

FIRE was one of the most extensive forms of wastage in Great Britain, said Mr. S. D. Studd, director of works for Manchester Corporation, in Leeds, on October 18. He was speaking at a meeting organized by Turners Asbestos Cement Company, Limited, to discuss structural fire protection. He stated that structural damage amounting to over £45,000,000 per annum was caused by fire.

THE CHURCH OF ST. AIDAN, Oxpsring, Penistone, of which Mr. G. L. Mancock, general manager of David Brown Industries, Foundries Division, Penistone, laid the foundation stone last April, is to be opened and dedicated on Saturday, October 29. The church stands on a piece of land given by David Brown Industries and is the first Anglican Church building to be built in the parish of Penistone since 1875.

MR. AUSTIN R. ZENDER, president and chief executive officer of the Bridgeport Brass Company, and Lord Glentoran, Northern Ireland Minister of Commerce, formally signed the agreement establishing the American firm's Ulster project at a ceremony in New York on October 21. One of the chief reasons for the selection of the Northern Ireland site was its proximity to the expanding European automobile industry.

MR. S. J. F. BEALE, managing director of the Derbyshire Silica Firebrick Company, Limited, Friden, Hartington, has presented long-service awards to employees at the 14th long-service presentation at the New Bath Hotel, Matlock. The presentations included six gold wrist watches for 40 years' service and five framed certificates for 25 years. The wives of recipients were also given Crown Derby jam dishes with covers.

YORKSHIRE ELECTRICITY BOARD is to instal an English Electric K.D.P. 10 electronic data-processing system in a building to be constructed for the purpose at Seacroft, Leeds. This will be the first time one of the Area Electricity Boards has adopted the use of a centralized electronic computing unit. The equipment to be manufactured at the Kidgrove, Staffordshire, works of the English Electric Company, Limited, is expected to come into operation in about two years' time.

MR. G. H. B. WILSON, chairman of Raleigh Industries, Nottingham, told a meeting of 80 Raleigh distributors on October 17, of developments in production. The famous Raleigh "moped" is to be replaced by two new mopeds and a scooter. The new machines are the Raleigh automatic, and a dual-seater, the Supamatic, each with a 49.85 c.c. engine, to be made under license from Motobecane; the scooter is from the Bianchi stable, and called the Roma, with a 77.8 c.c. engine.

EFFECTS OF THE MOTOR INDUSTRY'S current difficulties have not adversely influenced component manufacturers in the Wolverhampton area, it was reported on October 17 at a news conference called by the Wolverhampton Chamber of Commerce. The president, Mr. Douglas Jemmett, said that there were no indications either, that short-time working in the industry had resulted in any more available labour in the area. The level of manufacturing activity in the area remained very high.

WEST GERMANY'S fourth largest producer of refrigerators, and crane manufacturers, Franz Liebherr, of Biberach (Würtemberg), recently merged with the British firm of Merseyside Engineering (Refrigeration), Limited, with a view to starting the manufacture of German refrigerators in the United Kingdom. The merger occurred through the Liebherr Swiss holding company, Liholding Limited Liability Company. Liebherr has eight plants in Germany, as well as factories in South Africa and Ireland.

A NEW FILM RELEASE announced by Brook Motors, Limited, of Huddersfield, is "The Brook" a 16 mm. colour sound production, running time 28 min., made by the firm's own film unit. "The Brook" is the story

Here's Air Power at ROCK BOTTOM cost

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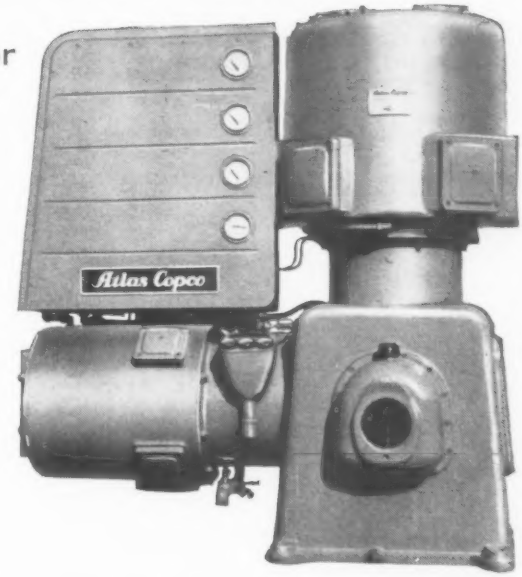

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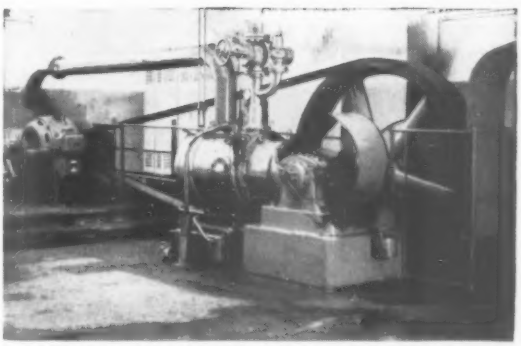

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News in Brief

of a Yorkshire river and of some of the industries it passes as it is traced from a moorland stream to the sea. Manufacturing sequences seen at several factories include such items as candle, tennis-racket, beer, comic postcard, textile, electric-motor and tractor production. The film is available on free loan on application to the firm's publicity department.

"SELLING CAPITAL GOODS," with special emphasis on exports, is the theme of a conference arranged by the British Institute of Managament to be held at Harrogate from November 16 to 18. Exports of goods to the underdeveloped countries will be considered by Dr. J. G. Mackay, chairman of Rustyfa, Limited, and chairman and managing director of Francis Shaw & Company, Limited, when he opens the conference. Other speakers will include Mr. A. H. White, vice-president of the Shipbuilding Conference, and deputy chairman and managing director of Lithgows, Limited, of Glasgow.

Personal

Mr. D. F. KERSHAW has been appointed general manager of the Canadian branch of Wolf Electric Tools, Limited, at 93 Advance Road, Toronto 18, Ontario.

Mr. IAN MORROW has been elected a director and appointed deputy chairman of Rowe Bros. & Company, Limited, brassfounders, and sheet-lead and lead-pipe makers, Bristol.

Mr. J. A. LAURENCE has been appointed to the board of Laurence Scott & Electromotors, Limited, in place of Mr. CLAUD LAURENCE who has resigned after 37 years' service with company.

Mr. ALAN S. GILL has retired from the board of George Cohen Sons & Company, Limited, a subsidiary of the George Cohen group, on attaining the age of 65, and will practise as an industrial consultant.

Sir HENRY SPURRIER, chairman and managing director of Leyland Motors, Limited, will be the principal speaker at the fourteenth annual dinner/dance of the Institute of Road Transport Engineers, to be held in the Piccadilly Hotel, London, on November 14.

Mr. R. L. E. KEATES, who was until recently home sales director of Steels Engineering Products, Limited only, has now joined the boards of R. H. Neal & Company, Limited, and F. Taylor & Sons (Manchester), Limited, the other two companies in the Steel group, in a similar capacity.

Nash & Thompson, Limited, Hook Rise South, Tolworth, Surrey, announce that Mr. R. G. SMITH has been appointed contracts manager; Mr. A. L. LEE, sales engineer for the Midlands and Northern England; Mr. D. H. YATES, sales office manager, and Mr. A. WARD, chief inspector.

A new sales and service office in South Wales, opened by West Instrument, Limited, at 63, The Exchange, Mount Stuart Square, Cardiff, is to be in the charge of Mr. L. G. A. GABE. Mr. D. R. H. LANE, another new member of the firm, has been attached to the London office staff of the company.

Mr. T. A. ATKINSON, managing director of Dynamo & Motor Repairs, Limited, a member of the Metal Industries group, is retiring from full-time employment with the company at the end of this month. He will remain as consultant for a time. Mr. C. E. VINCENT has been appointed director and general manager in succession to Mr. Atkinson.

Sheffield University Council on October 21 approved the following appointments:— Dr. J. V. S. MANI, B.E., M.TECH., PH.D. (Khargpur) to the ICI Research Fellowship in the Department of Fuel Technology and Chemical Engineering; and Dr. J. M. BEER, DIPL. ING. (Budapest), PH.D. (Sheffield), to an Honorary Research Fellowship in the Department of Fuel Technology and Chemical Engineering. The resignations were accepted of Dr. N. T. DUNWOODY, lecturer in applied mathematics; Dr. D. PARSONS, lecturer in physics; Mr. J. T. SMITH, lecturer in physics; and Dr. M. J. G. WILLIAMS, assistant lecturer in chemistry.

Obituary

Mr. BERT GREENWOOD TURNBULL, who was for many years a director of the Bremner Machine Company, Limited, printers' engineers, Wharfedale Ironworks, Otley (which went out of existence three years ago), has died.

Mr. WILLIAM NORMAN COULSON, Leicester area superintendent, AEI Lamp & Lighting Company, Limited, Melton Road, Leicester, has died at the age of 52. He was a past-president of the Leicester Association of Engineers.

The death has occurred of Mr. L. N. SHANNON. Together with Mrs. Shannon he was killed in a motor-car accident in America. Mr. Shannon was president of the International Committee of Foundry Technical Associations in 1953, when the Congress was held in Paris.

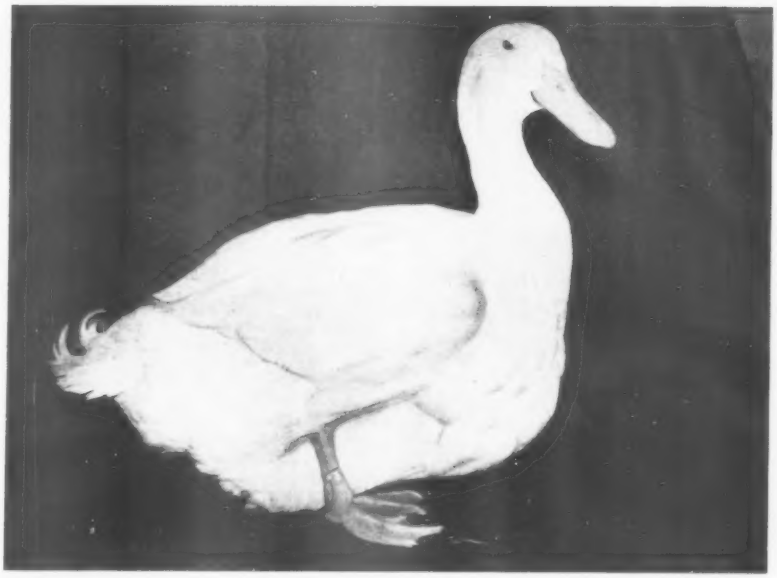
Mr. H. R. ABRAM, technical representative with W. J. Hooker, Limited, died suddenly on October 16 at the age of 43. Prior to joining Hooker's, he was for three years attached to Dyson & Company Enfield (1919), Limited. Mr. Abram joined the Institute of British Foundrymen in 1957 and has lectured before meetings of the Institute on die-casting subjects.

Professor H. W. SWIFT, professor of engineering at Sheffield University from 1936 to 1955, died suddenly on October 14 at the age of 65. Before going to Sheffield he was head of the department of mechanical engineering at Bradford Technical College. He was a Thomas Hawksley Medallist of the Institution of Mechanical Engineers, and Clayton Prizeman in 1953.

The death took place suddenly on October 10 of Mr. VINCENT E. UPTON, at the age of 70. He was managing director of Leigh & Sillavan, Limited, and a member of the Iron and Steel Institute, and Institute of Metals, and the Institute of British Foundrymen, having joined the latter in 1933. Mr. Upton was also a liveryman of the Worshipful Company of Founders and very well known in foundry circles.

The death has occurred at the age of 66, of Mr. GEORGE BRYDEN, chairman and managing director of the family business of George Bryden Engineering, Limited, automobile engineers, Seacroft Garage, York Road, Leeds. Mr. Bryden was from 1954 to 1958 managing director of Landmaster, Limited, Hucknall, Notts, but had to relinquish the post for health reasons. Earlier he had been managing director of Marshall Sons & Company, Limited, Gainsborough, and had been instrumental in the formation of the Marshall organisation, which includes John Fowler & Company (Leeds), Limited, of Leeds, and Sprotborough, and the creation of Marshall Richards Machine Company, Limited, of Crook, Co. Durham, pioneers of wire-drawing machinery.

AYLESBURY FOR DUCKS



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Raw Material Markets

Iron and Steel

Dearer coal and dearer coke are not to result in dearer pig-iron and steel. At a meeting on Tuesday the Iron and Steel Board considered the effect on the industry of the recent rises in the prices of coal and coke. These have added directly some £13,000,000 a year, or 14s. per ton, to the production cost of steel. After careful consideration the board decided not to make any general increase in steel prices as a result of the higher coal and coke prices.

On the other hand, this increase in costs has made it impossible to make further price reductions in continuation of the downward movement of the past two years. Any further changes which may be made this year in iron and steel prices are likely to be limited to a few products only, or to details of price structure, and are not expected to have any appreciable effect on the general level of steel prices.

The reduction in demands for castings from the motor-car industry is becoming more evident as outputs of castings from the foundries which produce mainly for that trade are on a reducing scale, and in some instances a four-day working week has been introduced. Compared with previous requirements, the current delivery schedules represent a fairly big reduction overall in tonnage of castings, but this section of the engineering foundries still has reasonably good order-books.

Other sections of the engineering foundries are well occupied in producing castings for many other trades. The machine-tool trade continues much busier and is calling for good tonnages, but from collieries and railways demands remain moderate. The requirements of these foundries for pig-iron is chiefly for the low phosphorus irons, but a substantial quantity of hematite and also some refined iron is being taken up. All of these grades are in good supply and producing furnaces can cope easily with present demands.

Business at the light foundries shows little change, and many have capacity to spare. Those supplying castings to the building trades continue to receive good support, but only moderate demands are made by the domestic utensil trades. These foundries have no difficulty in obtaining the required supplies of high phosphorus pig-irons. Producing furnaces continue to ship supplies overseas from the stocks and excess outputs which remain after home needs have been satisfied.

The foundries are well provided with the normal grades of both cast-iron and steel scrap. Foundry and hard coke is coming forward satisfactorily and ganister, limestone, and firebricks can be obtained to requirements.

The re-rollers continue well occupied, and substantial outputs are being obtained by them for all their products. Good demands are being made for small bars and light sections, and the heavy call for reinforcing rods is sustained. Shortage of labour still acts as a deterrent to increased outputs.

Most of the re-rollers have good supplies of mild steel billets, etc., in stock but higher carbon and alloy steels are more difficult to secure.

Non-ferrous Metals

Copper continues weak both in London and in New York. The gradual slide in prices in London is due to the generally discouraging industrial news, the continuing build up in stocks in spite of cutbacks in production—both announced and suspected—the fact that the prolonged strike at Chuquicamata looks like being settled shortly, and, perhaps too, to the uncertainty surrounding the price of gold.

In New York the adjustments of the price structure which began last week continued when the primary producers lowered their price to 20 cents a pound. This was soon followed by the custom smelters who came into line by reducing their price by 1 cent a pound. These changes in the US price structure have had their repercussions in Europe, Australia, and Japan, but there is no evidence that the lower quotations have resulted in an increase in the volume of business. The outlook is uncertain and the position could become complicated if the run on America's gold continues.

The tin market continues to maintain a steady undertone in London. The backwardation continues at around £5 a ton mainly due to the hold-up in supplies when the tally clerks were on strike. The market in Singapore is quietly steady and the same comment applies to America, where the New York spot price is over ç1.03 cents a pound.

Lead is dull in London and in New York. The easier position and cheerless prospects being heightened by the difficulties now experienced by the automobile industries. Stocks are adequate and the outlook is for gently sagging prices in London and for a reduction in the price in New York where the quotation is still 12 cents a pound.

Zinc, too, has been an unsatisfactory market on both sides of the Atlantic, due to the difficulties experienced by the automobile industries and, in America, by the inability of the steel industry to expand its production to anything near its rated capacity. In the US the quotation for East Louis spot metal is unchanged at 13 cents a pound.

Chemical Laboratory "Open Days"

The National Chemical Laboratory of the Department of Scientific and Industrial Research held Open Days on October 19 to 21. In selecting topics for display, an attempt was made to emphasize the newer achievements of the Laboratory, to exhibit the experimental resources and techniques available within it and to illustrate its regular day-to-day work. The work of the Laboratory was last on view in 1958 and since then, the research programme has undergone a number of changes and much of what was displayed was in the development stage. Amongst the exhibits and demonstrations of particular interest to foundrymen and those with foundry connotations were sections on the analysis of rare metals and rare earths, a Hilger projection comparator, soil-corrosion tests, the chemistry of silica solutions, development of plastic bonding materials and three types of spectrograph and spectrometer equipment.

Joint Iron Council Banquet

In connection with the annual banquet of the Joint Iron Council which is to be held at Guildhall, London on November 1 (next Tuesday), the president, Mr. N. P. Newman, C.B.E., J.P., has informed those attending that the reception will begin at 6.45 p.m. instead of 7.0 p.m. as stated on the tickets. This is so that the assembly may be in good time to receive the Lord Mayor of London and H.R.H. the Duke of Edinburgh who are the chief guests. Special arrangements have also been made for parking and receiving cars arriving in the Guildhall area; particulars of these have already been distributed to those participating. (It is understood that for quite a considerable time all seats for the banquet have been taken up by members and guests.)

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

October 26, 1960

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6d. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over; N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 7s. 6d.; Birmingham, £25 14s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £43 10s. 0d. to £46 0s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £59 0s. 0d. to £63 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 20s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 11s. 8d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 14s. 8d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £81 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr. scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £61 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping under 10 tons).—BASIC: soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (1 ton to 10 tons).—Ship plate (N.-E. Coast), £41 12s. 0d.; boiler plates (N.-E. Coast), £44 2s. 0d.; floor plates (N.-E. Coast), £43 10s. 0d.; angles (N.-E. Coast), £38 16s. 6d.; joists (N.-E. Coast), £38 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 17s. 0d.; nickel-chrome, £98 11s. 0d.; nickel-chrome-molybdenum, £111 4s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £218 5s. 0d. to £218 10s. 0d.; three months, £220 10s. 0d. to £220 15s. 0d.; settlement, £218 10s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 2½d. per lb.; rods, 235s. 0d. per cwt. basis; 20 s.w.g., 269s. 6d. per cwt.

Tin.—Cash, £798 0s. 0d. to £798 10s. 0d.; three months, £795 0s. 0d. to £796 0s. 0d.; settlement, £798 10s. 0d.

Lead (Refined Pig).—Second half October, £68 5s. 0d. to £68 10s. 0d.; second half January, £69 0s. 0d. to £69 5s. 0d.

Zinc.—Second half October, £88 10s. 0d. to £88 12s. 6d.; second half January, £86 7s. 6d. to £86 10s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £124 2s. 6d.; rolled zinc (boiler plates), all English destinations, £121 17s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £102 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10d. per lb.; sheets to 10 w.g., 195s. 9d. per cwt.; wire, 2s. 7¾d.; rolled metal, 195s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £166; B6, £218.

Brass (High Tensile).—BS1400, HTB1, £190; HTB2 £207; HTB3, £226.

Gunmetal.—BS1400, LG2, £207; LG3, £217; G1, 1%, £279; G1, 1%, £270.

Phosphor Bronze.—BS1400, PB1 (AID released), £303; BS1400, 90/10/1, £288.

Leaded Phosphor Bronze.—BS1400, LPB1, £230.

Phosphor Bronze Strip, etc.—Strip, 282s. 6d. per cwt., wire, 4s. 0¾d. per lb.; rods, 3s. 2¾d.; tubes, 3s. 2¾d.; chill cast bars, solids 3s. 2¼d.; cored 3s. 3¼d (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 2d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £200 0s. 0d. Quicksilver, ex-warehouse, £70 10s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £240. AB2, £249

* Average 68-70 per cent.

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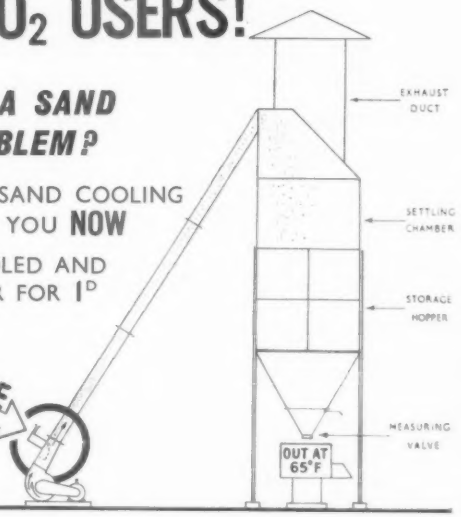

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Company News

LAPORTE INDUSTRIES, LIMITED—The interim dividend of 3 per cent. is maintained on a capital increased to £11,822,760 (£8,757,600).

LAYCOCK ENGINEERING, LIMITED—The formal increased offer for the preference and ordinary capital of Hardypick, Limited, has now been sent to holders. The Hardypick directors now recommend the offer.

COCHRAN & COMPANY ANNAN, LIMITED, engineers and boilermakers—Final dividend of 6 per cent., against a 5 per cent. minimum forecast, makes 8 (9) per cent. for the year ended June 30, 1960. Net profit fell from £94,108 to £72,443, after tax of £72,283 (£104,985).

OXLEY ENGINEERING COMPANY, LIMITED—Dividend of 12½ per cent. plus a capital distribution of 3 per cent., is to be paid for the year ended June 30, 1960. In the previous year a total of 16½ per cent. plus a 2½ per cent. net capital distribution was paid. Group net profit was £68,218 (£84,127), after tax of £54,778 (£61,804).

NEEPSEND STEEL & TOOL CORPORATION, LIMITED—The dividend is being maintained at 50 per cent., on capital increased by a one-for-four scrip issue, for the year to March 31, 1960, with a final of 37½ per cent., representing an effective increase in the total of 10 per cent. Group trading profits improved from £1,105,196 to £1,210,920, and the net profit is up from £604,371 to £704,246.

PROJECTILE & ENGINEERING COMPANY, LIMITED—An increase of 2 per cent. to 6 per cent. in the interim dividend on account of 1960 is announced. A final of 11 per cent. made a 15 per cent. total for 1959. The board states that the interim is increased in view of the healthy state of the order-book and the fact that—as forecast by the chairman last May—the current year has so far proved to be satisfactory, with profits ahead of last year.

EXPERT TOOL & CASE HARDENING COMPANY, LIMITED—At last week's meeting in London, the chairman, Mr. Sidney H. Newman, said that all companies in the group were now operating at a profit and, in fact, for the nine months ended September, a small surplus was earned by the group. The cash problem, however, was still the dominant factor, but, provided that this could be contained, he could now predict that the company would make a profit for the year as a whole.

POLLARD BALL & ROLLER COMPANY, LIMITED—In addition to raising its interim ordinary dividend to 5 per cent. from the equivalent of 4 per cent., the company proposes to make a one-for-two scrip issue and also to raise about £500,000 by means of a rights issue on favourable terms to stockholders. The directors expect to recommend a final dividend of 14 per cent. for 1960 on the capital increased by the proposed issues. The 1959 final was 20 per cent. prior to an one-for-four scrip issue.

HILLS (WEST BROMWICH), LIMITED, manufacturers and engineers to the building trade—Order-books have continued to build up and at the year-end, July 31, 1960, there were sufficient orders to keep all departments busy for the rest of the year, the directors state. Competition for labour, shortage of materials, and site deferments by clients meant that although trading results for the year were better than last year, they failed to come up to expectations. The company, should, the directors add, become progressively more profitable.

Indian Industrial Expansion

In an article entitled "Progress in Engineering and Technology" appearing in *India News*, it is stated that the machine-tool industry in India represents an instance of steadily expanding production. The first batch of predominantly Indian lathes were produced in 1956 by the Hindustan Machine Tools, Bangalore. In 1957/58, the firm produced 402 machines. The firm is also taking up the production of other machine-tools such as radial drills and grinding machines, as part of a programme to diversify production. The present plan is to produce 1,000 machines annually by 1960/61 and a proposal to double production to 2,000 machines has recently been approved.

A large foundry/forge project is planned to be established at Ranchi, with the technical collaboration of Czechoslovakia, and the Czech Government has given £7.5 million of equipment on credit for implementing this project. When completed, the foundry/forge will produce 25,000 tons of grey-iron castings, 15,000 tons of steel castings and 14,000 tons of forgings. It will also have the capacity to produce individual 30-ton forged pieces and to cast in steel 50-ton components. A machine-shop with a capacity of 16,000 tons will be attached.

Another building plant is being erected at Ranchi for the production of heavy machines, plant and equipment, such as coke ovens, blast-furnaces, steel melting shops, cranes, etc., with a capacity of 80,000 tons. This project is being undertaken with the help and technical co-operation of the USSR. A heavy electrical plant is being erected at Bhopal with the technical collaboration of a British firm and heavy transformers, industrial motors, traction motors and switchgear are likely to be in production by 1960/61.

Lake & Elliot Trust Fund

The chairman of Lake & Elliot, Limited, in his statement accompaying the report and accounts for the year ended July 31, announced that in memory of the late Mr. William Beard Lake, J.P., the founder of the company and president of the Institute of British Foundrymen in the years 1939-41, a sum of money has been transferred to the Official Trustees of Charitable Funds to create a trust fund. Income from the fund will be administered by the governing body of the Braintree College of Further Education and will be utilized to provide prizes to students of that College or to students resident in Braintree, who are in attendance at any school, university or other educational establishment approved by the governors for achievements in metallurgical, founding, engineering, and commercial subjects, as well as the humanities.

Foundry Services' Group change Names

In view of the group's expansion of interests and activities beyond the foundry industry, particularly to other metallurgical processes, the two principal controlling companies of the Foundry Services' group have announced changes in name. The holding company, Foundry Services Holdings, Limited, and in which the controlling interest is held by Minerals Separation, Limited, becomes Foseco Holdings, Limited, and the managing company, Foundry Services International, Limited, becomes Foseco International, Limited.

LABORATORY EXTENSION is being built on to the existing laboratory of William Boby & Company, Limited, water treatment engineers, of Rickmansworth (Herts). It will double the existing laboratory capacity.

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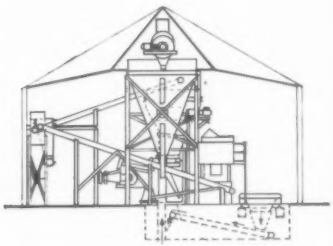

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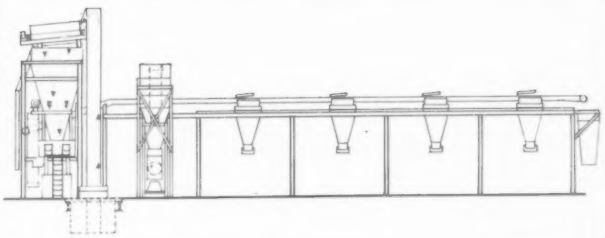

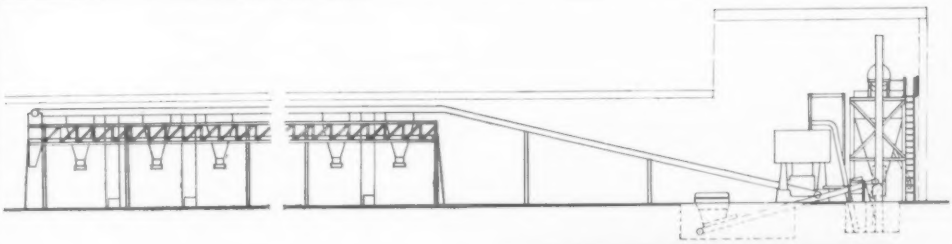

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American Letter

Need for Quality Castings in Materials-handling Industry

The American journal *Modern Castings* has recently carried out a survey in relation to greater sales of castings in the materials-handling industry. A selected group of top materials-handling executives was approached, each of them attached to companies making a wide variety of mechanical-handling devices such as monorails, hoists, fork-lift trucks, cranes and conveyors. The variety of castings reported in use on current models of such plants exceeded 50.

As might be expected, the matter of cost was high on the list of reasons for buying—and also for not buying—castings. One company felt that the casting process was the most economical for large repetitive jobs, another used castings for short runs where they could not afford to tool up for a forging operation, and in other situations, castings were cheaper than complex welded fabrications, unless one or two were needed.

Other advantages for the use of castings were put forward as follow: Casting was regarded as an ideal fabricating technique for highly-complex shapes; no other process had the versatility of metal casting when it came to intricate configurations with internal cavities shaped by cores. It was stated also that casting was the most flexible process in using the broad spectrum of alloys available and in size parameters which were practically limitless. Engineers liked the design freedom which is possible when working with castings, as stresses could be distributed effectively throughout a variety of section sizes without dangerous stress concentration. Makers of handling equipment liked the as-cast finish on surfaces that did not have to be machined and the excellent machinability of cast metals—especially grey iron—contributed an appreciable net-saving in finished-part costs.

It was stated that great market opportunities for castings in materials-handling equipment were awaiting foundrymen and the survey carried out showed that there were about a dozen improvements needed before sales were likely to increase. Among these were the supply of "cleaner" castings—free from excess sand, surface porosity and other defects; castings having consistent quality (chemically, metallurgically and physically); castings made to close tolerances to minimize machining; castings made of heat-treatable alloys, which could be welded with simple preheating and postheating; castings which could be made in sand comparable to die-castings and precision-investment castings, and castings which could be designed stronger and lighter.

Finally, the survey concluded by stating that foundries were traditionally small—far too small to carry out expensive fundamental research that was required to stay constantly competitive. It was suggested that a united effort subsidized by every foundry in direct proportion to the gross value of castings shipped, was one answer to guaranteeing the future of castings.

Blast-furnace for Coke, Oil, or Gas firing

Dominion Foundries & Steel, Limited, of Hamilton, Ontario, Canada, has a new blast-furnace which can be fuelled by coke (the conventional heat source), natural gas, or heavy fuel oil. The company's president, Mr. F. S. Sherman, says "If tests show that economies can be achieved by supplementing coke with oil or natural gas, we will be able to use such fuels." Steel companies the world over are testing the use of gas as a supplement to coke in blast-furnaces, as it is believed its use would save money and produce a purer product. Petroleum companies are also testing new uses for oil, including oil in blast-furnaces. Dominion Foundries new blast-furnace can yield 1,000 tons of pig-iron daily and is equipped with other devices such as pressure controls and increased stove capacity, which permit greater production, higher operating temperatures and the use of varying types of ore.

News from South Africa

Mining and Metallurgical Congress

The mineral industries of South Africa, South-West Africa and the Rhodesias will be on display at the seventh Commonwealth Mining and Metallurgical Congress to be held in Johannesburg from April 10 to May 6, 1961. The purpose of the Congress is to provide a free interchange of views on practical and theoretical aspects of all branches and phases of the mineral industry.

Visits have been arranged to mines and ancillary industries and to research and educational establishments. These include manganese, platinum and copper mines as well as the iron and steel works at Pretoria and Vereeniging. At the technical sessions in Johannesburg and Northern Rhodesia, papers presented will deal with iron, steel, and ferro-alloy production in South Africa, and converter practice and refined copper casting at Mufulira. The social side, too, is well catered for, and arrangements include a visit to the world-famous game reserve—the Kruger National Park, and displays of tribal dancing.

Iron-ore Production at Iscor Mine

Up to 1,000 tons per hour of alluvial iron-ore is being ripped and bulldozed into stockpiles on the Iscor mine at Sishen, Northern Cape. This open-cast ripping method shows considerable savings over drilling and blasting, and has been made possible by the introduction this year of Caterpillar D9 tractors. The hydraulic tractor-mounted rippers are proving a worthwhile investment.

Blast-furnace Re-lined

Having produced 1,779,834 tons of iron since it was completely relined in June, 1951—the stack only was relined in October, 1954—the No. 2 blast-furnace at the Pretoria Works of the S.A. Iron & Steel Industrial Corporation recently underwent this operation for the fourth time. It was first blown-in during November, 1936. The time taken from blast-off to blast-on was 31 days 7 hours. Several improvements were made, including an increase of the hearth diameter from 16 ft. 1 in. to 16 ft. 10 in.

Monsanto/Chemstrand Negotiations

Monsanto Chemical Company of St. Louis is negotiating for the acquisition of the entire interest of the American Viscose Corporation, of Philadelphia, in the Chemstrand Corporation. This involves Viscose's 50 per cent. interest in both Chemstrand's stock and subordinated notes, which are estimated to amount to $9,500,000 at the time the plan would be consummated.

Under the proposed plan, Viscose would receive 3,540,000 shares of Monsanto common stock which would be subject to special voting provisions so long as they are held by Viscose. Viscose has no intention of disposing of the Monsanto shares at the present time. Prior to consummation of the plan, it is contemplated that Chemstrand will pay its usual annual $5,000,000 dividend, one half of which will accrue to Viscose, and redeem $2,500,000 of its $12,000,000 subordinated notes. Following the transaction, Chemstrand will continue its activities as a separate entity.

Industry in the Midlands

At a news conference following the meeting of the Midland Regional Board for Industry in Birmingham on October 18, Major C. R. Dibben, chairman of the Board, said that there was no cause for pessimism about the outlook for industry in the region generally, nor, in the long term, for the car industry.

In his trend of trade report, Major Dibben said that the Board had noted that except for the car and supplier industries and some sections of the consumer goods industries, the high level of industrial activity in the Midlands continued to be well maintained. Heavy engineering, the metals industry and most manufacturers of plant and machinery were reported to be very active. Most sections of the electrical construction industries were fully occupied and the civil engineering industries remain very busy.

Major Dibben said that the Board held that it was essential for the Government to keep the closest watch on the effects of the credit restrictions on the level of production and on the general level of business activity, and to act promptly "when it is decided that any easement is necessary and practicable." He added "At the same time the Board recognised the continuing need for a healthy balance of demand as a prerequisite for a higher consumer spending at home."

The continuing strong demand in the region for labour, particularly skilled, was reflected in the register of unfilled vacancies which, in September, totalled nearly two-and-a-half times the number of registered unemployed. The unemployment rate in the Midlands fell from 1 per cent in mid-August to 0.8 per cent in mid-September compared with the national average of 1.4 per cent.

Science-teaching Awards

Results of the 1960 competition for the "Griffin & George Prizes" for science teaching by practising teachers in primary and secondary schools have now been announced. The winner of the first prize of £25 in Group P (Primary) was Miss J. N. Norcliffe, Market Street J.M. School, Hoyland, near Barnsley, Yorks, for her paper "Pond Study—as a means of introducing elementary surveying and drawing to scale; and encouraging the observation of living things." For his paper describing "Apparatus to Demonstrate the Addition of Waves," Mr. F. Merry, B.SC., of Leigh Central County Secondary School, Lancashire, was awarded the first prize of £25 in Group S (Secondary).

The awards were made by the committee set up by the organizers, Junior Club Publications, Limited, and the money prizes were granted by the Griffin & George group of companies, manufacturers of laboratory furnishings and equipment, Ealing Road, Wembley, Middlesex. The awards are to be made again next year, and teachers are asked to send for entry forms to Junior Club Publications, 5, Great James Street, London, W.C.1.

Triplex acquires Eclipse Foundry

Purchase price paid by Triplex Foundry, Limited, for all the share capital of the Eclipse Foundry & Engineering Company (Dudley), Limited, and its subsidiary, Eclipse Metal Industries, Limited, was £82,500. Cash payment totalled £52,500 and the balance was provided by the issue of 50,000 5s. ordinary Triplex Foundry shares at an issue price of 12s.

It is proposed to change the company's name to Triplex Foundries' Group, Limited, and at the same time arrangements are being made for the name Triplex Foundry to be protected by forming a new subsidiary to adopt that title.

FACTS AND FRICTION

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SITUATIONS WANTED

GENERAL MANAGER, 20 years' experience in iron foundry management, estimating, costing and labour control. Customer relationship and sales, can negotiate at highest levels. Has also practical knowledge of all foundry practices. Box GM885, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST/TECHNICIAN (30), L.I.M., A.M.I.B.F., H.N.C., N.F.C. Diploma, experienced high duty irons, steel and light alloys, desires progressive position in modern foundry. Management preferred. Salary £1,200 p.a. Location West Midlands. Box FM877, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER, aged 39, desires change; City and Guilds Metallurgy, practical experience iron, steel and non-ferrous, mechanised and jobbing, CO_2 and shell moulding, estimating, rate-fixing and cost control systems, and radiographic inspection. Box FM905, FOUNDRY TRADE JOURNAL.

STEEL FOUNDRY METALLURGIST, 35, A.I.M., 16 years' wide experience laboratory work, foundry practice, arc, induction, open hearth melting, seeks position including responsibility for steel production. Box SF900, FOUNDRY TRADE JOURNAL.

SITUATIONS WANTED—*contd.*

NON-FERROUS FOUNDRY TECHNICIAN, 25 years' experience all types of gravity diecastings, piston production, some experience of shell core making and centrifugal casting, desires change, can act as technical representative. Birmingham area. Box NF892, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE position sought by A.M.I.B.F. (33), versed in: CO_2, shell and rubber-plaster processes; investment and frozen mercury; sand, gravity and pressure die. Used to meeting people at all levels. Resident Wolverhampton. Clean, current, driving licence. Box TR907, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN, experienced in aluminium gravity diecastings, capable of taking full charge, desires change with prospects. Box FF906, FOUNDRY TRADE JOURNAL.

YOUNG EXECUTIVE, at present Chief Metallurgist of large foundry, desires managerial appointment. Technical and practical experience in the development and quantity production of grey alloy, and SG iron castings by modern moulding and melting techniques. Present salary £1,650. Box YE902, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

EXPERIENCED METHODS ENGINEER required for West of Scotland Steel Foundry. Weight range up to 10 tons. Box EM898, FOUNDRY TRADE JOURNAL.

EXPERIENCED BRASS CASTER required, Midland area, high wages and modern house supplied for right man. Box EB903, FOUNDRY TRADE JOURNAL.

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He must be free to travel regularly in U.K. and visit U.S.A. or Europe occasionally. Location London.

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Salary: the man required is probably earning about £2,500 now.

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Surplus Foundry Plant and Forging Equipment

Best prices given

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SITUATIONS VACANT—*contd.*

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The British Cast Iron Research Association requires men with technical experience in the ironfounding industry and thorough training in foundry metallurgy, foundry engineering or sand technology for appointments in its Development Department.

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Dia. top	Dia. bottom	Depth
40 in.	36 in.	36 in.
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27½ in.	25½ in.	26 in.
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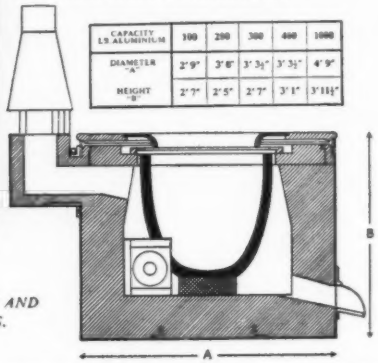

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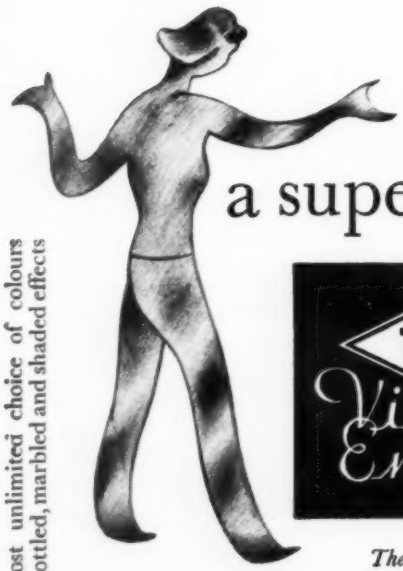

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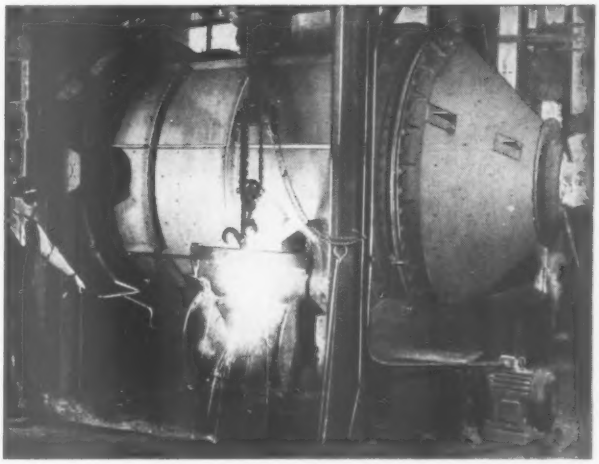

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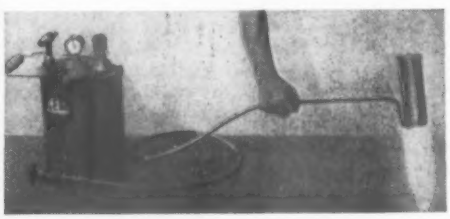

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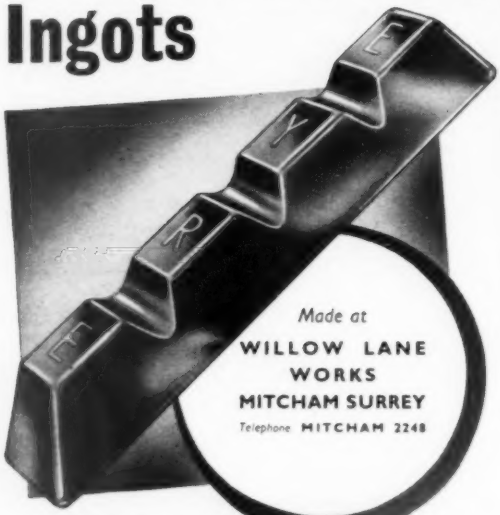

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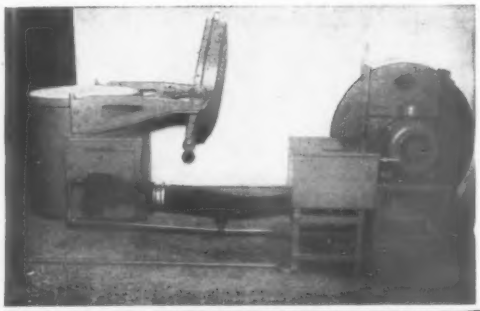

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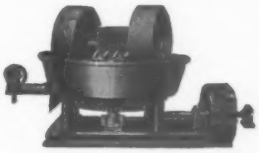

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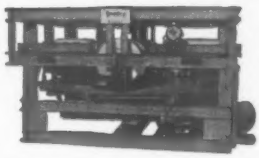

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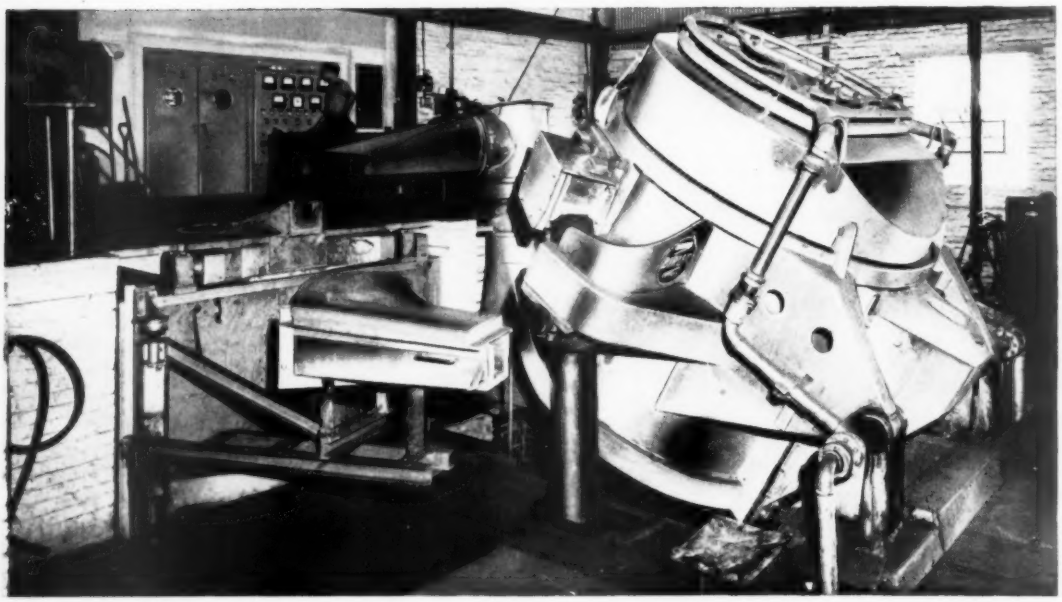

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